Pit and Quarry

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SAND AND GRAVEL PRODUCERS GET TOGETHER AND DISCUSS IMPORTANT ISSUES

DETROIT was host to more than four hundred members and guests of the National Sand and Gravel Association on January 4th, 5th, and 6th. The occasion was the Twelfth Annual Convention. For weeks preceding the convention a most effective direct-by-mail publicity campaign had aroused more than the usual pre-convention interest. New convention features were promised; important papers were to be read; and something unusual in entertainment was being offered. Because of the hard work of Charles Ray as general convention chariman, the Michigan sand and gravel producers, and the national officers, this convention was all that was promised, and with its unusual features eclipsed all previous meetings.

The program of speakers was well arranged and enthusiastically received. All papers presented except one appear in different parts of this issue. The paper entitled, "Profitless Prosperity," by E. St. Elmo Lewis, particularly, was unusual and created much discussion. The machinery exhibit was larger than the one last year and was especially well attended. The annual banquet was an innovation in its program and arrangement. Its night club setting with music, dancing and musical comedy proved to be the high light of the convention. The sixty ladies present were given special attention in the entertainment program. This convention started something for the ladies that will be carried out at each succeeding convention. Teas, fashion show, theater party, shopping tour, airplane sightseeing tour and banquet made up this program.

Charles Ray and his associates received a special resolution of appreciation from all in attendance for the splendid program that all enjoyed. V. P. Ahearn, executive secretary, L. J. Dyament, Henry Battjes, L. E. Williams, J. J. Haarer and H. M. Davison were among those who worked hard with Charles Ray.

Hugh Haddow, Jr., called the convention to order on Wednesday morning, January 4th, with a cordial welcome. Charles Ray introduced J. E. Maris, a member of the cabinet of the Mayor of Detroit. Mr. Maris officially welcomed the convention to Detroit.

A joint luncheon of producers and machinery exhibitors was held at noon on Wednesday. J. L. Shiely was chairman, and in his characteristic manner introduced a number of those active in the affairs and counsel of the association. The remarks of several who made comments were directed to approving the machinery exhibit. Stephen Stepanian fooled a good many by distributing candy that looked very much like gravel that had been scrubbed in the kitchen sink.

Charles Ray

T. E. McGrath commented at length on the dangers of over production in the industry. He explained the campaign among the railroads conducted by the Illinois Sand and Gravel Producers to enlist railroad cooperation in discouraging the building of new plants in territory already overcrowded. The railroad support was secured largely because they foresee in an increased production a decrease in rates. Mr. McGrath's challenge was, "If you can't protect your industry, you can't protect your own business." He suggested that the association members inform their bankers, railroads and machinery manufacturers regarding the

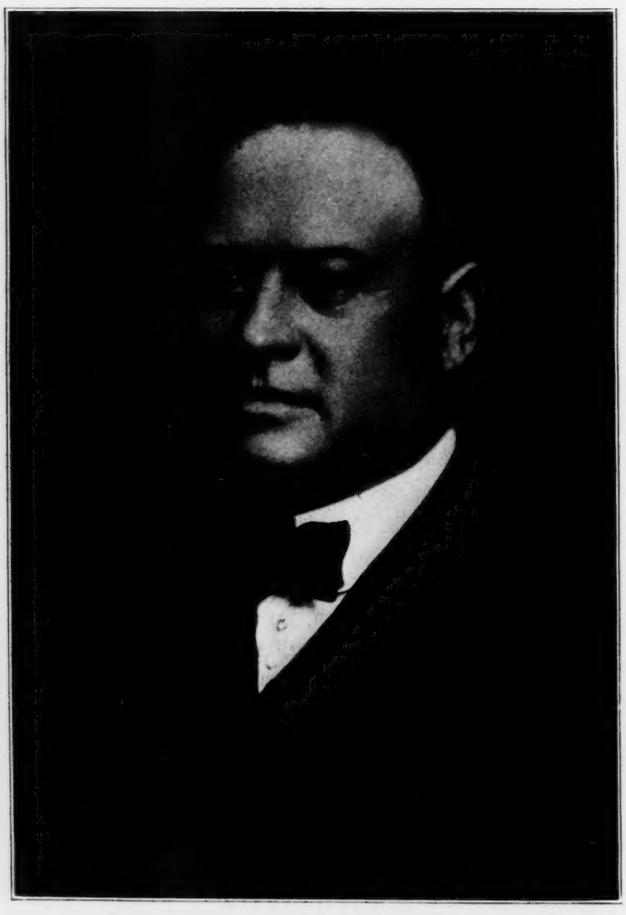
Hugh Haddow Jr.

true state of affairs, soliciting their cooperation in discouraging new plants from being started.

The Board of Directors held a meeting on the afternoon of January 4th. Earl Zimmerman, secretary treasurer, presented his report which showed the financial affairs to be in the best shape since the founding of the Association. The budget for 1928 was presented by Mr. Zimmerman also as chairman of the budget committee and was approved. The budget anticipates expenditures of a little more than $46,000 during 1928, which is about $4,000 more than was spent in 1927. The fiscal year of the Association was changed from between March first and February twenty-eighth to December first through November thirtieth.

Earl Zimmerman as chairman of the nominating committee reported the nominees to the Board, and they were later approved and elected by the convention. R. C. Fletcher was elected president. F. D. Coppock was elected vice president and Earl Zimmerman was re-elected secretary treasurer. R. J. Potts, H. V. Owen, H. S. Davison and F. W. Peck were elected to the executive committee with the officers.

J. L. Shiely presented to the Board a proposal that the Association headquarters be moved to some more central location such as Chicago. After considerable discussion the question was referred to the executive committee for detailed consideration and study. A report will be prepared and submitted to the Board at a later meeting for definite action. The principal reason advanced for a central location, such as Chicago, was the need to make headquarters more accessible and convenient to members. Priority orders and car shortage were the principal points of value mentioned for the



R. C. Fletcher, Elected President

John Prince

Washington location, but these two conditions are of no further concern.

J. R. Thoenen representing the Bureau of Mines presented a proposal of the Bureau of Mines to undertake such investigations of technical operating problems concerning the sand and gravel industry as the Association might propose. He particularly emphasized the study of production costs. The proposal was referred to a committee consisting of John Prince, T. E. McGrath and F. D. Coppock for further study with instructions to present a report to the Board later.

Stanton Walker

The proposed Association laboratory was also discussed by the Board. The executive committee was authorized to install the laboratory after a certain sum of money had been received from subscriptions. The laboratory is practically assured as nearly sufficient funds have been subscribed already by individual members and local associations.

The sessions were opened Thursday morning with the reading of telegrams from the Governor of Ohio and the Mayor of Columbus urging Columbus for the next convention. A telegram was read containing greetings from Otho M. Graves and an invitation to all producers to visit the National Crushed Stone Convention at West Baden, Indiana.

The reports of the officers were presented at the Thursday morning session and are published in full here.

Transportation Problems

M. J. Gormeley, Chairman, Car Service Division, American Railway Association, discussed the subject, "Transportation Problems In Connection With The Sand and Gravel Industry" informally at the Thursday morning session.

Mr. Gormeley contrasted transportation conditions in 1920 with those of today. In 1920 the sand and gravel producer was considered a necessary evil. Coal was much in demand that year. Service to the sand and gravel industry was bad. Today that condition could hardly occur. Then the shortage of cars to the sand and gravel industry was charged to the coal industry. Since 1920 the service has been improved through better cooperation and modern equipment.

New cars have replaced obsolete equipment; larger capacity cars have reduced the number of cars involved; and an order requiring the return empty on the part of railroads of coal cars has brought about this improved situation.

The advisory boards throughout the country have been of great help in ascertaining conditions. There has been a decrease of $10,000,000 in the demurrage collected from 1920 to 1926. Less demurrage means more cars. The loading capacity of cars has been increased one ton per car since 1923.

From 1923 to 1927 there has been an increase of thirty-three per cent in loadings of sand, gravel and stone, but there was no increase in the number of cars to handle this traffic increase. On January 1, 1923, there were placed in service 700,000 new cars which replaced obsolete equipment. This new equipment, proper regulations, and better cooperation have solved the problem.

F. W. Peck Brought the Gang from Missouri Valley

In Mr. Gormeley's opinion there is little danger of any car shortage in the future and certainly none because of the coal industry. The sand and gravel industry is entitled to cars the same as the coal industry. This situation is now recognized. The only factor that might affect the situation is the revenue to the railroads. Should this be restricted, it might hinder the railroads from replacing obsolete equipment. One interesting fact mentioned was the decrease in the railroad operating expense of one billion dollars since 1920.

Cooperation between V. P. Ahearn of the National Sand and Gravel Association and the Car Service Division was cited by Mr. Gormeley as of value in several instances to the sand and gravel industry.

President Haddow's Report

This report marks the completion of my second year as president of the National Sand and Gravel Association. During the two year period in which I have been in office there have been many changes in our Association. It has witnessed a reorganization of the Washington Office. The Engineering and Research Division has been brought up to a point where it is one of the dominating factors of our work. This work has been so important that extraordinary efforts have been instituted to extend the work and it now seems as if we were in a position where we can face the future with confidence and a feeling that we have the power to be of lasting benefit to our industry.

I also desire to call attention to the financial condition of our Association. We have wiped out all deficits and can point with pride to a surplus. The Bulletin has been taken from the liability column and placed among the assets of the Association, and at the same time it has preserved a high standard of mechanical perfection, with a much wider scope in usefulness to the industry of the articles which it publishes.

These things have been made possible by hard work and cooperation. The officers and Executive Committee have functioned splendidly and have backed up the fine work that has been accomplished by the staff of the Washington Office. There will be no attempt in this report to give a detailed account of the many activities of the Association during 1927. The reports of the Executive Secretary and the Engineering and Research Division cover this phase of the matter thoroughly.

The morale of the Washington Office has been on a very high plane, each individual working with all the others for the best interests of the Association. I cannot commend too highly the work of the different members of our office force and they are one and all entitled to share in the credit of what has been accomplished.

In addition to the improvements already spoken of there is the question of the conduct of our annual convention. Great changes have been made which it is believed will be of lasting benefit. By the institution of the machinery exhibit, a real educational feature has been added to our conventions. Sand and gravel producers can now go to our conventions and maintain an intimate and constant contact with engineering developments in the sand and gravel industry. Not only has this been of educational advantage, but has also given opportunity for the producers and the manufacturers of machinery to unite and become acquainted with each other. The conventions have been put on a plane that makes the attendance at our annual meetings a real pleasure and benefit to any producer.

These are among the accomplishments which we contemplate with pride and it is reassuring to look ahead for the next year. The establishment of the Research Laboratory now seems an assured fact. When the laboratory starts to function there will be more and lasting benefits to be derived by our membership. There is much that can be done by the Research Division and the personnel of this division is ready and anxious to produce results. What they can accomplish will depend largely on the support given by the Association.

With reference to the work of the Executive Secretary, it can be said that more calls are made on him than ever before for information and personal service to member companies. The Executive Secretary is in a position to render service to member companies along a great many different lines and as in the past all members applying to the Washington Office for help in difficulties or for any information will find that they are able to get a real service that is cheerfully and painstakingly rendered.

At this time, let me call to your notice the increase in our membership list, which has been approximately eight per cent. This increase has been reflected in an additional income. It has also meant a larger demand on the facilities of the Washington Office. This increased demand has been met by additional forces until at the present time we have the largest office force that the Association has ever had. The fact that these increases in our forces have taken place and that the whole office works like a well-oiled piece of machinery reflects great credit on our personnel.

As I reach the end of my term of office, I cannot but say how much I have enjoyed the work of the past two years. It has been a real pleasure to be associated on intimate terms with the men of this Association, and I know that no small amount of the pleasure I have had has been due to my contact with the members of the staff of the Washington Office. Their interest in their work and in the welfare of the Association has been so wholehearted and intense that it has been communicated to all those who have come in contact with them.

It is with a genuine feeling of regret that I look forward to the lessening of the close personal contact which will come with the expiration of my term as president. This feeling is tempered, however, by the fact that I shall continue my active interest in the affairs of the Association and will do whatever I can to aid in its efforts to be of the greatest possible service to the sand and gravel industry.

V. P. Ahearn's Report

V. P. Ahearn, Executive Secretary, presented the following report:

In submitting the report of the Executive Secretary covering the year 1927, there will be no attempt to describe in minute detail the many and varied activities of the Association in behalf of individual members and the industry in general. It is well, however, to refer to certain aspects of the work of the organization which are of general significance and which are worthy of particular emphasis.

We are able to point first of all to the most healthful financial condition which the Association has ever enjoyed. We are not only entirely free of all indebtedness, but it has been possible during the past year to accumulate a comfortable cash surplus. This has permitted additions to the staff of the Washington Office and a consequent broadening of the service which is furnished to members. Our steadily increasing membership warrants the hope that the financial affairs of the organization will continue to improve, placing us in a condition to carry out a comprehensive program which will undoubtedly be of direct benefit to the membership.

Our report submitted at the last convention stated that the National Sand and Gravel Bulletin, the official publication of the Association, was well on its way toward being self-supporting. This latter condition has not only been achieved during 1927, but The Bulletin has shown a surplus. Under these circumstances, we have definitely decided to increase the circulation of the magazine in order that full effectiveness may be realized. We hope also to increase the size of the publication and, as future developments warrant, to add to its editorial staff.

Another subject which is appropriate at this time is the introduction of the machinery exhibition idea at conventions of the Association. Our first exhibition was held one year ago in conjunction with the convention at Cincinnati. Every available booth was reserved by prominent manufacturers interested in the sand and gravel field. This record has been duplicated for the exhibition at the Detroit convention, even though we increased the amount of exhibit space by 25 per cent. This is a positive indication of the success of the first exhibition at Cincinnati, and gives us reason to believe that a display of modern engineering equipment for use in the production of sand and gravel is a feature which is of distinct educational value to the men of the industry. A Manufacturers' Division of the Association has been formed, and the members of that division have been freely consulted in arranging for the 1928 exhibit.

Prospects for 1928

Reliable estimates indicate that sand and gravel production in 1927 increased approximately 6 per cent over 1926, although some sections of the country reported a decrease in production. Nothing appears on the business horizon for 1928 which would lead us to anticipate anything but a successful year. This is especially true with reference to highway work in several states. The demand for our products for structural building also promises to be good. General prosperity in the United States is inevitably accompanied by intensive building activity, and although 1928 is one of the so-called presidential years when business in the past was presumed to lag, this fallacy is no longer the source of concern. The surveys of many leading business organizations point to a continuation of the present prosperity.

Over-Production Problem

During the year 1927 much consideration has been given by individual groups of sand and gravel producers to the future of the industry. Several of these have agreed that the present potential capacity of established sand and gravel plants is more than sufficient to meet any normal market demand. It was felt, therefore, that the sand and gravel industry should take advantage of every legitimate means at its disposal to acquaint the public with the fact that existing plants are more than capable of supplying any demand which may be placed upon them. Two state associations have addressed letters to the railroads serving their territories, calling their attention to these facts and enlisting their cooperation in giving them adequate publicity. The results have been encouraging.

These activities on the part of organized groups in the sand and gravel industry seem to have prompted a consideration of whether they are in conflict with the provisions of anti-trust legislation. Probably the most expedient method of deciding that question is to study the decision of the United States Supreme Court in a suit instituted by the Government which involved alleged illegal activities of a trade association. Justice Stone, in delivering the opinion of the court, stated his conception of the lawful activities of organizations as governed by the anti-trust law, in the following words:

"We decide only that trade associations or combinations of persons or corporations which openly and fairly gather and disseminate information as

to the cost of their product, the volume of production, the actual price which the product has brought in past transactions, stocks of merchandise on hand, approximate cost of transportation from the principal point of shipment to the points of consumption as did these defendants and who, as they did, meet and discuss such information and statistics without, however, reaching or attempting to reach any agreement or any concerted action with respect to prices or production or restraining competition, do not thereby engage in unlawful restraint of commerce."

Thus, for the first time, industry knows what the law enjoins them from doing and, likewise, what the law permits them to do. A group of persons engaged in the same industry may meet and openly discuss the cost of their product, the volume of production, the actual price which the product has brought in past transactions, stocks of merchandise on hand, and the likely demand in the future for their product, according to the Supreme Court. But there must be no agreement as to concerted action in these matters, nor any attempt to reach such agreements.

The question of a more fitting stabilization of the established sand and gravel industry is one which is engaging the serious attention of everyone connected with it. It is the belief of a large group that the foundation on which stabilization must rest is accurate and comprehensive cost accounting. The production of sand and gravel is essentially a manufacturing business. A uniform cost system will give the manufacturer comparable results. That is to say, it will afford him assurance that other manufacturers in his line have included the same item of cost, that their enterprises have been departmentalized in substantially the same way as his own, that there exists a common treatment of overhead, a tying up of the financial and cost records. In other words, when the producer of sand and gravel studies his summary of manufacturing cost, he should be able to feel that other producers are figuring their costs in the same way that he is and that any differences in cost which may exist are based on superior efficiency and not upon the ignoring of any item of expense.

The logical agency to entrust with the preparation of a uniform cost accounting system for the industry is the National Association. Some preliminary studies have already been made and we have been in communication with a responsible accounting firm of national reputation which is equipped to devise a system which could be adapted to the requirements of every producer. It is realized that a large percentage of the industry has used accounting systems for a great length of time, but it should be remembered that there are others who would welcome a scientifically prepared method of keeping costs. No provision has been made in the 1928 budget of the Association for carrying out such an activity, but we offer the subject for consideration at this time, with the hope that suitable action can be taken at an early date.

Southwestern Rate Case

By an order dated June 13, 1927, the Interstate Commerce Commission instituted an investigation into intrastate and interstate rates on sand, gravel, crushed stone and related commodities in Texas, Louisiana, Arkansas and Oklahoma. The Commission stated that it was their intention to use the proceedings as a means of fixing a scale of rates on these commodities for general adoption in the Southwest.

As it was imperative for Southwestern producers to take some steps immediately to protect their interests, the National Association arranged a meeting of the industry, at which time steps were taken for the employment of traffic counsel to present a united case to the Commission, in cooperation with the crushed stone producers who were affected in equal measure. The action of the National Association in this case was in line with the policies followed in handling the Western Rate Case, described in detail in the last report of the executive secretary. It is not necessary to point out the wholesome benefits derived from such a procedure, for joint action results in efficient and economical representation of the sand and gravel industry in a single case, and our past experience shows that this is the only effective way of opposing the efforts of the carriers to increase our rates.

The Southwestern proceeding grew out of the Hoch-Smith Resolution. This legislation is beginning to assume larger proportions than had been originally anticipated. When it was introduced in Congress by Senator Smith of South Carolina and Representative Hoch of Kansas, it was designed as a farm relief measure. The essence of the resolution is that it directs the Interstate Commerce Commission to make a sweeping investigation of the entire freight rate structure, with the purpose of making "revisions" in rates which will permit of softening the burden on agricultural products. Quite aside from the unconstitutional aspects of the resolution (for Congress is not empowered to direct that one industry be preferred over all others in rate making), we can not see the fairness of penalizing the sand, gravel and crushed stone industries in order to subsidize the agricultural industry by giving it rates which do not represent the cost of service. If, on the other hand, present agricultural rates are too high, then the Commission should reduce them to a fair level, but they should not seek to preserve the revenues of the carriers by transferring the load to another industry which is already over-taxed.

The Southwestern case is but the forerunner of a concerted effort to bring all sand and gravel rates in the country under investigation. It may rea-

sonably be expected that for the next several years the industry will experience litigation designed to "standardize" the sand and gravel rate structure. The Administration has declared that "Competent authorities agree that an entire reorganization of the rate structure for freight is necessary, and this should be ordered at once." Our industry and related industries seem to be among the first to be selected for scrutiny, and it is the part of wisdom for every producer to keep closely in touch with developments and to cooperate with others in his business in avoiding the imposition of unreasonable rate burdens. The Association stands prepared to render assistance to other groups which are confronted with proposals similar to the Southwestern rate investigation.

Workmen's Compensation Insurance

After an extensive survey by the United States Employees' Compensation Commission, instituted as the result of a formal request by the National Association, it was decided that the crews of dredges and barges in sand and gravel dredging operations and employees operating stationary winch engines upon floats, alongside of or attached to sand and gravel docks, in connection with unloading operations, are not subject to the provisions of the Longshoremen's and Harbor Workers' Compensation Act. It was further held, however, that laborers not members of the crew assisting in unloading sand and gravel barges are in maritime employment within the meaning of the law while working on the dredges or barges.

The interest of the National Association in the matter was prompted by the fact that several of its member companies with operations on the Ohio River had received notice from their insurance companies that the compensation rates which had theretofore prevailed would be increased 65 per cent if it were found that the Federal Compensation Act referred to above applied to river sand and gravel operations.

The whole question of compensation insurance on workers engaged in marine operations is rather complicated at the moment, but J. L. Richmond, of the Union Sand and Gravel Company, Huntington, W. Va., has prepared a comprehensive discussion of the subject for presentation at this convention. This will undoubtedly lead to action by the National Association looking toward a definite solution of current difficulties. If marine sand and gravel operators have no employees in maritime employment on navigable waters of the United States except masters and members of the crew of a vessel, they would have no operations coming with the terms of the Federal Compensation Act. They are, therefore, in the same position that they were in at the time the Act became effective on July 1, 1927. In such a situation their requirements with respect to compensation insurance under state law or otherwise is unaffected. If state authorities decide that they have no jurisdiction over crews of vessels, marine operators would be subject to their ordinary liability in admiralty which they might carry or cover by marine insurance. If the law relating to the state fund should be amended to authorize it to cover liability fixed by the Federal act, it would not affect a company now having no liability under such act, and it would appear that it could not be covered by compensation law unless the Federal act should be amended to include the crews of vessels within its terms.

A rather limited investigation also discloses the possibility of securing a downward revision of fire insurance rates in sand and gravel operations. Under present schedules now in use in the eastern part of the country, sand and gravel appears to be in the same classification with other industries where the fire hazard is much greater. We intend to go into the question more thoroughly in 1928 and, when our investigation is completed, to make suitable recommendations to the Board of Directors with respect to formal action by the Association.

The general question of insurance brings to mind the fact that much can be accomplished in the way of reducing compensation rates in all sand and gravel operations. The first step in that direction, manifestly, lies in safety precautions about the plants. Sources of danger can be eliminated and a sincere effort can be made to avoid preventable accidents. Of course, we should see to it that no rate is fixed in any state which is clearly out of reason and which is inconsistent with the normal conduct of the business of the sand and gravel industry.

Car Supply

Due to the splendid cooperation of the American Railway Association, an adequate car supply was given to the sand and gravel industry during 1927. Only a small number of individual car shortages were brought to our attention by member companies, and these were speedily adjusted by the Car Service Division of the railway association.

Our transportation requirements were met despite a strike in the bituminous coal fields which began on April 1 and has not been settled at this writing. The sand and gravel industry will have no difficulty in recalling what coal strikes in the union fields meant during past years, notably in 1920 and 1922. Unintelligent supervision which prevailed at that time produced drastic priority orders for car distribution, the effects of which were to impose heavy financial losses upon the sand and gravel industry, without improvement of the conditions they were designed to cure. We believe it proper at this time to renew our pledge of cooperation with the American Railway Association in their efforts to treat all industry impartially in transportation matters.

Income Tax Service

The records of the Washington Office show that during 1927 there were more calls than ever before for personal tax service by member companies. This part of our personal service is conducted with the assistance of H. R. Stutsman, who is retained as tax counsel by the Association. In many cases, members have been saved the time and expense involved in making trips to Washington in connection with tax matters; the organization has performed such duties as arranging hearings before the Bureau of Internal Revenue, securing extensions of time for filing tax returns, ascertaining the status of long-delayed tax appeals, advising members as to their rights under the income tax law in specific cases presented for our consideration, and in many other ways.

In view of the highly satisfactory results which have been secured through our income tax service, we take this opportunity of recommending to all member companies that they use this service freely in the future. What it amounts to is that every member has in Washington an experienced income tax counsel who is qualified to advise them on all details of tax procedure.

Personal Service to Members

In view of our emphasis in past reports that the Association is prepared to render personal service to member companies in connection with practically every phase of their business, we have received many requests of this kind in 1927. Each case was handled promptly and results were achieved. There does not seem to be any end to the scope of the demands for personal service, and it is evident that members consider this feature of their affiliation with the organization to be of real value. We enumerate below some of the calls which have been made for service, although space limitations do not permit of complete reference:

Depletion on tract of land secured under loyalty agreement; assessment of customs duty on imported aggregates; claims for damage to railroad cars due to use of mechanical loading and unloading devices; question of merging sales and distribution factors in sand and gravel industry; interpretation of the combination rule; aiding in preparation of local publicity campaigns; opposition to legislation for imposition of tax upon sand and gravel dredged from streams; application of car service orders issued as result of flood conditions; markets for used equipment; advising and assisting members in rate proposals affecting whole territories; objectionable trade practices of railroads publication of rates on less than statutory notice; information concerning effects of proposed Federal legislation; aiding in creation of state associations; depreciation on floating equipment used in sand and gravel production; establishment of proper rates on workmen's compensation insurance.

Cleaning and Repairing Cars

Through the medium of a resolution adopted at the last convention of the Association, the question of unreasonably heavy expenses which are incurred by sand and gravel producers in cleaning and repairing cars has been presented to the American Railway Association for handling with the various carriers. A paper on the subject has been prepared by J. C. Buckbee, of the Northern Gravel Company, Chicago, Ill., for presentation at this convention. It will point the way for more effective work in behalf of the industry.

It is provided in the car service rules that carriers shall place cars at the disposal of shippers which can be calculated to transport commodities to destinations safely under ordinary circumstances. There is no real excuse, therefore, for furnishing cars at sand and gravel plants which are either not clean or in need of major repairs.

Value of Organization

It has been said that constancy is the foundation of success. Perhaps it would be sufficient then if this report were confined to the statement that the Association has continued to dedicate itself to the principles which have marked the eleven years of its existence. During that time the sand and gravel industry has emerged from the comparative obscurity of a minor factory in the industrial life of the nation, and has established itself as an essential contributor to the material growth of the country. It is certainly no exaggeration to state that the instrumentalities of the National Sand and Gravel Association have aided this remarkable growth. The organization has brought the industry together in a national way; it has functioned as a means for the discussion of mutual problems; and it has earned for the industry the substantial recognition which it now enjoys.

Stanton Walker's Report

The report of the engineering and research division was made by Stanton Walker, Director. The full report follows:

The Engineering and Research Division of the National Sand and Gravel Association has completed its second year and it is felt that the work which it has carried out has been of considerable value to the industry. The organization of efforts and the crystalization of purpose brought about by the first year's activities have enabled us, it is believed, to direct our work more effectively and along somewhat more definite lines during the second year than in the first. Our facilities for carrying out work have been increased by the addition of C. E. Proudley, formerly of the Bureau of Public Roads, to the Association's staff. Mr. Proudley devotes half of his time to the work of the Engineering and Research Division and half to that of the Executive Secretary. It is not feas-

ible nor desirable to give a detailed account of the many different phases of our work during the year, but it is hoped that a brief discussion of certain of the more important activities will give some idea of its nature and enable you to judge of its value to the industry.

The activities of the Engineering and Research Division may be classified roughly, under the following subdivisions:

1. Preparation of literature giving information concerning the use of prepared sand and gravel.
2. Distribution of information through talks delivered before groups of engineers, contractors, sand and gravel producers, etc.
3. Distribution of information through correspondence in response to inquiries received from both those within and without the industry.
4. Representing the sand and gravel industry in engineering societies and in committees engaged in preparing specifications which affect the industry.
5. Cooperation with various organizations carrying out researches having a hearing on the sand and gravel industry.
6. Rendering direct engineering service to member companies.
7. Studying test data to develop information concerning sand and gravel.
8. Inspection of construction involving the use of sand and gravel.

No attempt has been made to state the different classifications in order of their importance. They will be discussed, briefly, in the order named.

Literature

The preparation and distribution of literature furnishing accurate information concerning sand and gravel seems to offer a most valuable field of endeavor. Properly prepared literature containing useful information cannot fail to be a helpful promotional medium. During the year two bulletins have been prepared and distributed, and a third is in preparation. Three chapters of the third bulletin have already been published in the National Sand and Gravel Bulletin and certain of the more important information contained in the first two chapters have been distributed in the form of circulars. These publications are distributed to a large and carefully selected mailing list consisting of sand and gravel producers, highway and municipal engineers, engineering schools and colleges, members of engineering organizations, contractors, etc. In addition to these, a number of miscellaneous articles have been published in the National Sand and Gravel Bulletin and in other magazines which are believed to contain information of value to producers and users of sand and gravel alike.

The purpose and the value of these publications should be self-evident. Bulletin 1, "Estimating Quantities of Materials for Concrete," describes an accurate method for computing quantities of materials and emphasizes the importance of using certain gradings and classes of materials. It should also be helpful in adding to the reputation of the National Sand and Gravel Association as a source of accurate and useful information. Bulletin 2, on the "Relation of Aggregates to Concrete" should be helpful in furthering the distribution of fundamental information concerning concrete and concrete aggregates, and in pointing out the desirability of using prepared materials. Bulletin 3, "Representative Specifications for Different Uses of Sand and Gravel," now in the process of publication, will provide a source of accurate information concerning the requirements of sand and gravel for different purposes. The miscellaneous items which appear in the Bulletin each month, under the heading of "Observations from the Engineering and Research Division," are designed to bring useful information to the attention of the producer, which he might not otherwise receive.

Other publications are planned for next year; one consisting of comprehensive tables giving quantities of materials for concrete is now in preparation.

Papers and Lectures

Talks delivered before groups of engineers, contractors, sand and gravel producers, etc., present a valuable means of disseminating information on sand and gravel and of spreading knowledge concerning the work of the Association. This phase of our work has not been developed as much as is considered desirable, due to our limited personnel. It is hoped that more work of this nature can be done in the future. During the past year we have discussed the use of prepared sand and gravel and the work of the Association before the following organizations:

Northwest Branch, Associated General Contractors of America Annual Convention, at St. Paul, Minnesota.

Associated General Contractors of America Annual National Convention, at Asheville, North Carolina.

New Hampshire Good Roads Association, at Concord, New Hampshire.

Massachusetts Sand and Gravel Association, at Boston, Massachusetts.

Michigan Sand and Gravel Association, at Detroit, Michigan.

Ohio Sand and Gravel Association, Annual Meeting, at Columbus, Ohio.

Missouri Valley Sand and Gravel Association, Annual Meeting, at Kansas City, Missouri.

Wisconsin Mineral Aggregate Association, Annual Meeting, at Milwaukee, Wisconsin.

These activities, together with those described elsewhere in the report, have necessitated twenty-four trips, totaling 115 days of absence from the city.

Work of this nature will be continued next year—three lectures having already been scheduled.

Distribution of Information by Correspondence

Correspondence provides a most valuable and flexible means of furnishing information on specific questions. One reason for its value is that it permits of concentration of effort on a single subject and provides a definite goal for our activities. One disadvantage, of course, is the lack of general distribution. We are fortunately situated to furnish accurate data on a wide variety of subjects, due to the many sources of information available in Washington, and a considerable amount of work has been done along this line. Some idea of its volume may be gained from the fact that this Division has written something over 2500 letters, about 175 per cent of which were originated by producers and users of sand and gravel. A large proportion of the latter class contained requests for information.

Probably as many inquiries for information have been received from individuals outside the industry as from those within. These inquiries, particularly those from outside the industry, cover a wide field. We have furnished information on the uses of blue clay, sources of supply of sand and gravel for special uses, water-measuring devices for concrete mixers, methods of testing sand and gravel, specifications for different uses of sand and gravel, on competing aggregates, concrete products, stucco, premixed mortar and a great variety of other subjects.

Specific mention of some of the cases in which information was furnished should be of interest. The following gives only a few of those which involved careful study of available information:

Abrasion tests of gravel. This involved a review of the history of the test and a study of a large amount of test data.

Comparisons of tension and compression tests.

Effect of grading of asphalt sands.

Royalties on sand and gravel extracted from navigable streams.

Quantities of materials for concrete.

Comparisons of sand and gravel with competing materials.

Flint pebbles for use as a grinding medium.

Effect of impurities in gravel.

Consumption of sand and gravel as compared to population in various cities.

Many other examples might be mentioned but these should suffice to give an idea of the possibilities of this medium for distributing information of value to the industry. It is hoped that producers and users of sand and gravel will make an even more liberal use of our services in this respect in the future.

Engineering Societies and Committees

If our activities were to be arranged in the order of their importance, certainly that of representing the industry in engineering bodies dealing with specifications and tests of sand and gravel would be near the top of the list. In this manner we are able to present to engineers the viewpoint of the sand and gravel industry on all factors which involve our interests, and they, in turn, welcome all of the information and constructive suggestions which we can give them.

Close contacts have been maintained with the work of the various engineering societies. Association or individual memberships are maintained in the following organizations:

American Society for Testing Materials.
American Concrete Institute.
American Society of Civil Engineers.
American Society for Municipal Improvements.
American Railway Engineering Association.

The American Society for Testing Materials and the American Concrete Institute are particularly active in their studies of sand and gravel specifications and test methods, and we have cooperated regularly in their committee work.

In the American Society for Testing Materials we hold membership in the following committees and sub-committees:

Committee C-9 on "Concrete and Concrete Aggregates." Executive Sub-Committee (because of being Secretary of main committee). Technical Sub-Committee. Sub-Committee 1 on "Definitions." Sub-Committee 5 on "Specifications and Methods of Tests of Aggregates" (Chairman of Section on "Abrasion Tests of Aggregates"). Sub-Committee 8 on "Deleterious Substances in Concrete."

Committee D-4 on "Road and Paving Material." Sub-Committee on "Non-bituminous Road and Paving Materials." Sectional Committee 3 on "Gravel, Crushed Stone and Crushed Slag Bases and Surfaces." Sectional Committee 5 on "Concrete Pavements and Bases" (Sub-sectional Committee on "Aggregate Qualities"), Sub-sectional Committee on "Proportioning and Mixing"). Sectional Committee 7 on "Size of Aggregates."

Committee E-1 on "Methods of Testing" (Section on "Coarse Screens" as Special Adviser).

In the American Concrete Institute we hold membership in the following committees:

Committee E-3 on "Research."

Committee E-5 on "Aggregates" (Chairman Sub-Committee on "Gravel").

Committee P-1 on "Standard Building Units."

In connection with the work of Committee E-5 on "Aggregate" we were afforded an opportunity to present a comprehensive report on the "Requirements of Gravel as a Concrete Aggregate," which was published in the 1927 Proceedings of the American Concrete Institute and in the May, 1927,

issue of the National Sand and Gravel Bulletin. A report covering abrasion tests of gravel has been prepared for presentation to the committee this year.

Our committee affiliations are given in this much detail to point out the wide scope of the activities in which it seems the Association should be represented. A considerable amount of time is required for work of this nature, but it is felt that the time could not be spent to better advantage.

There are many other opportunities to represent the sand and gravel industry by cooperations with allied organizations than through committee work, which are discussed under another heading.

Cooperation with Research Organizations

Cooperation with research organizations should rank close in importance to that of representing the industry in committee work. Many different researches are being carried out which involve studies of sand and gravel, but which do not have for their primary object the solution of problems of our industry. In certain cases we have been able to make suggestions which have made it possible to obtain more specific information on questions of particular interest to the industry and in certain instances we have been able to correct what seemed to be erroneous conclusions by suggesting other tests to clarify the question further.

Our experience has been that research organizations are glad to receive our comments on data involving the use of sand and gravel, and this circumstance gives us an opportunity to state our case, sometimes before the researches are started, or before the results are made generally available. A considerable number of opportunities have been offered to cooperate in this manner. Examples are, cooperation with the Bureau of Public Roads in securing aggregates for special tests and suggestions offered to the Portland Cement Association and other organizations, at their request, for subjects for research. Other examples would require a more detailed description than feasible in this report.

Engineering Service to Member Companies

Direct engineering service has been rendered to members in a considerable number of cases during the past year. Work of this nature is considered to be of special importance since it directs the Association's work along lines of most immediate benefit.

Perhaps the truest examples of direct engineering service are those which involve personal contacts with the work in question. A number of opportunities were had to do work of that nature, although it is felt that this phase of the Association's activities might be developed with a greater realization on the part of the membership of the value of such work and as our facilities are increased. Among the examples which may be cited are the following:

(1) One of our member companies has had difficulty in disposing of his sand for use in highway construction because of its grading, in spite of the fact that it is an excellently graded material. A thorough discussion of this problem with the engineers of the highway department of that state brought about immediate temporary measures which partially relieved the situation and it seems likely that permanent relief will be afforded before the beginning of the next construction season.

(2) The sand of a member was being rejected by the field inspector and, after delay and accumulation of demurrage charges, accepted on tests carried out at the state highway department's laboratory. An investigation disclosed a fundamental error in the method of making the field test, and a demonstration of the correct method resulted in eliminating the difficulty.

(3) A concrete highway was placed under circumstances which made it desirable that complete information be obtained on the quality of materials used and on the construction methods. The writer remained on the job during the construction and later submitted a report on the materials and methods.

(4) Strength tests, abrasion tests, sieve analyses, etc., have been carried out at the request of member companies in several instances.

(5) Tests of yield of different types and gradings of aggregates in concrete were made at the plant of a member and a report submitted, giving quantities and costs of materials per cubic yard of concrete.

In addition to work such as that listed, there is a great deal carried on by correspondence which would properly come under this classification and which has been discussed in sufficient detail in another place in this report.

Studies of Test Data

Correlation of existing test data referring to sand and gravel has continued to be an important branch of our work. As pointed out in last year's report, a great many researches are carried out which involve the use of sand and gravel but which have another purpose in view than the solution of the problems of the aggregate industry. Studies of such data enable us many times to bring out information of value to our industry which was not at once apparent in the original presentation. Certain information of this nature has been included in articles in the Bulletin, but most of it is accumulated for future use.

The Inspections of Construction Involving Use of Gravel

A number of inspection trips have been made for the purpose of observing construction where gravel has been used as the coarse aggregate. As

an example of this type of activity, close contacts have been maintained during the construction of an experimental road by the Virginia State Highway Department, and of one by the Alleghaney County, Pennsylvania State Highway Department. A number of different highway projects in Pennsylvania have been visited for the purpose of observing the quality of materials and construction methods employed. Opportunities have been had to observe highways and other construction in many different parts of the country.

Plans for Future

It is planned to continue the general activities of the nature described in this report along very much the same lines as have been followed this year. It is hoped, of course, that more and better work can be done.

Plans for extending our work by the addition of a research laboratory, which were discussed briefly in our last year's report, seem to be nearing consummation. The Board of Directors of the National Association, at its meeting in Chicago in June, authorized the Executive Committee to canvass the membership of the Association with a view to obtaining special funds, through voluntary subscription, for the establishment of a laboratory at the Association's headquarters in Washington, and for its operation until such time as the regular income of the Association is sufficient to support the new work.

This action was taken after careful consideration of a report submitted by a committee, consisting of Fred D. Coppock of the Greenville Gravel Corporation (Chairman), A. W. Dann of the Keystone Sand and Supply Company, and John Prince of the Stewart Sand Company, appointed for the purpose of making a study of the desirability and feasibility of establishing a laboratory in which the problems of the sand and gravel industry can be investigated.

The first request for cooperation in getting the new project under way was made about the middle of August. This request has been followed by a second letter to each member and by statements in the Bulletin. In addition, special letters have been sent to a number of individual members who, it was felt, were especially interested in the work of the Association but had neglected to reply to the earlier letters.

While it cannot be said that there has been a general response from the membership, sufficient subscriptions have been received so that it seems that the desired amount will be obtained when the membership as a whole realize more completely the value of research work.

The status of this new development is described in more detail in the report of the Committee on Engineering Problems, F. D. Coppock, Chairman.

Many feel that the establishment of the laboratory will be the most forward-looking step which the Association has taken. Certainly there can be no question of its value to the industry. It will, if intelligently operated and adequately supported, enable the sand and gravel industry to take its proper place among those other organizations which are promoting their industries by advancing the knowledge of their materials.

The importance of research was emphasized in a recent address delivered before the Chicago Association of Commerce by Edward J. Mehren, Vice-President of the McGraw-Hill Publishing Company. After discussing its great value as one of the long-time guarantees of prosperity, he said:

"I hold out to you a promise, future industrial success, if you employ research, and I hold a threat, industrial lameness and decay, if you neglect it.

"Back of the immediate and commercial types of research there must be another type, deeper in character, which is concerned with pushing back the boundaries of the unknown. On the results of this more basic form of research is built all of the great development that has made for the progress of the world since history began. Investigations of this type can not be controlled. It is not possible to know before-hand what the result may be. It must suffice the investigator to know that there should be a result, either positive or negative. This type of research is to industry what the telescope is to the astronomer. The field is limitless.

"It is the responsibility of every American business executive to give generous support to cost reduction efforts and to industrial and scientific research."

Depreciation Scale Report

At the Atlanta Convention of the National Sand and Gravel Association two years ago, a Standard Depreciation Scale Committee was appointed to study a proposed standard depreciation schedule for use of the members in preparing income tax reports (if any). The old saying, "As sure as death and taxes" might be applied to our plants for they begin to depreciate as soon as they are set up and the taxes are adjusted to the degree of serviceable life remaining in each piece of equipment. When some of the producers were asked what percentage of the original value of each part of their plant was written off as depreciation each year, the answers varied so widely that there was a very apparent need for determination of the actual depreciation and a better uniformity in the claims made in tax returns.

Such a schedule was prepared by a special committee of the Southern California Rock Products Association and submitted to the national organization for consideration by producers in other sections of the country. The replies from these operators indicated a remarkable agreement with the experience of the California members. Ex-

cepting for some unusual conditions, this should be expected as plants and operations are much the same in this respect throughout the industry. The general contractors have made good headway in their efforts to establish a similar schedule and have derived real benefit from the recognition of actual depreciation costs.

Your committee recommends that the following schedule be submitted once more to the members for suggestions regarding items added since the last report and that the replies be used to complete a final list which should be adopted as standard and given the widest publicity so the rates agreed upon will be generally used to determine taxable value of sand, rock and gravel plants. It will be noted that several items of marine equipment have been added as requested by some members.

Standard Depreciation Schedule

Equipment	Economical Life, Years
Auto-crane, gas	5
Auto-crane, steam	6
Auto-truck	3
Barges, wooden	8
Barges, steel	12
Batchers	2
Bins, wooden	8
Boiler mountings	10
Buckets, clamshell	4
Buildings	10
Cars, quarry	4
Cars, wood dump	4
Cranes, caterpillar	4
Cranes, gantry	6
Cranes, locomotive	6
Crushers, single roll	5
Crushers, jaw	8
Crushers, gyratory	8
Drag-line, gasoline	5
Drag-line, excavators	5
Drag scrapers	1
Dredges, clamshell	7
Dredge, dipper	6
Dredges, hydraulic	10
Electric power equipment	6
Engines, gasoline	4
Engines, oil	5
Engines, steam	10
Hoists	10
Launches, gasoline	6
Loaders	3
Locomotives, industrial, steam	8
Locomotives, gas	5
Locomotives, electric	8
Motors	6
Pipe, galvanized	3
Pontoons	8
Pump, centrifugal	5
Rails	5
Rock Drills	2
Scales	10
Shafting	10
Shovels, steam	5
Shovels, gas	4
Shovels, electric	6
Shovels, Diesel, oil	5
Steamers, paddle wheel	16
Tugs, screw propelled	16

The following items of equipment are so short-lived and uncertain that they are recommended for listing as Operating Expense;

Belt Feeders
Belting, Conveyor Belts
Bin Gates
Buckets, Drag-line
Cables, Wire
Chains, Steam Shovel
Chains, Drive
Chutes
Chute Liners
Dippers, Steam Shovel
Dipper Teeth
Elevator Buckets
Grizzlies
Pulleys
Screens
Screens, Shaking
Sprockets
Switches
Ties
R. R. spikes and bolts

The resultant of all depreciation in the average sand, crushed rock and gravel plant is, as nearly as we can determine, fifteen (15%) per cent, representing a useful life of seven years for the original investment.

Depreciation was considered as the loss of original usefulness beyond the ability of repairs to correct and have allowed for the normal credit or scrap value in establishing the number of years of economical life. Inasmuch as obsolescence may retire a piece of equipment even before it has reached the service age here allowed, these estimates are considered quite conservative. Recent experience of producers who have found their entire plants practically obsolete because of completion of highway programs or shrinkage of anticipated market demands would well justify the increase of our total plant rate to 20 per cent. Where a flat rate for the entire plant may be used, we feel that the commissioner of Internal Revenue should readily recognize the reasonableness of our rate of fifteen per cent. This report was prepared by G. A. Rogers, chairman of the committee.

Manufacturers' Exhibit

The Manufacturers' Division of the National Sand and Gravel Association elected H. M. Davison chairman. A committee was appointed to prepare

a constitution and effect a permanent organization. M. B. Barber, E. P. Escher and H. M. Davison constitute this committee.

The exhibits were held in a large L shaped room across from the convention hall. The association of the exhibit with the meeting room had much to do with the splendid interest in the exhibit. The following is a list of the exhibitors.

The Allen Cone Company
Exhibited a model sand cone, bulletins and catalogs. Mr. Tompkins in attendance.

Allis Chalmers Manufacturing Company
Displayed photographs of Allis Chalmers equipment in sand and gravel plants. Complete catalogs and bulletins on display. Messrs. Bond, Davis, Goldberg and Migneault in attendance.

American Manganese Steel Company
Manganese steel products were displayed including a model 12 inch pump, manganese steel apron feeder, chain and dipper teeth. Photographs and catalogs were on display. Messrs. Carr, Daniels, Blakemore and Nagle were in attendance.

Bakstad Crusher and Equipment Corporation
A model of Bakstad 3 jaw crusher was displayed along with photographs and bulletins. Mr. J. R. Bakstad in attendance.

W. H. K. Bennett Company
A model dredging unit was displayed with a model 12 inch Diamond pump and a model Diamond agitator. Manganese steel products of Pettibone Mulliken Company were also displayed. Photographs and catalogs were also shown. Messrs. Bennett, Smith and Andersen in attendance.

Blaw Knox Company
Models of buckets, batchers and a turntable were equipped along with photographs and literature. Mr. Lamp in attendance.

Brookville Locomotive Company
Photographs and literature were attractively arranged. Mr. Lampe in attendance.

Bucyrus-Erie Company
Photographs mounted on special panel illuminated created a very attractive display of Bucyrus Erie units in operation. Bulletins also were exhibited. Messrs. Richards, Titus and Wyse in attendance.

Cement Mill and Quarry
Copies of recent issues on display. Mr. R. A. Goodwin in attendance.

Chain Belt Company
Rex Stearns cast iron idler, chain and buckets on display with photographs and literature. Messrs. Stearns and Davis in attendance.

Cincinnati Rubber Manufacturing Company
Exhibited samples of belting, suction hose, chute lining and dredge sleeves with photographs and literature. Messrs. Baldwin, Darnell, Kersten, and Young in attendance.

Cross Engineering Company
Perforated metal screen plate was displayed with literature and photographs. Mr. Nicol in attendance.

Dorr Company
Models of the Dorrco sand washer and Dorrco bowl classifier were displayed with photographs and literature. Messrs. Gery and Newton in attendance.

Dravo Contracting Company
Mounted display of photographs of dredging units and auxiliary equipment was displayed with literature. Messrs. Coolidge, Edwards and Leigh in attendance.

Eagle Iron Works
Model washer exhibited with photographs and literature. Messrs. Aulmann and Laird in attendance.

Easton Car and Construction Company
Exhibited car models and motion picture machine showed Units in operation. Also literature and photographs. Mr. Fraunfelder in attendance.

Fairbanks Morse and Company
Displayed mounted photographs of Fairbanks Morse equipment. Messrs. Bader and Robie in attendance.

Farrell Cheek Steel Foundry Company
Displayed dipper teeth, chain, buckets, sheaves and sprockets with photographs and literature. Messrs. Ritter and Scott in attendance.

The Fate-Root-Heath Company
Photographic panel display with literature. Mr. Heath in attendance.

General Electric Company
Photographic panel display, also 10 horse power induction motor with photographs and literature. Messrs. Appleton and Reeves in attendance.

Hardinge Company
Photographs and literature. Messrs. Bamman, Finch and Metz in attendance.

Harnischfeger Sales Corporation
Motion picture machine showing Harnischfeger units in operation, also photographs and literature. Messrs. Harrai and Mensch in attendance.

The Hayward Company
Working model of clam shell bucket displayed, also photographs and literature. Messrs. Davison and Ryder in attendance.

The Heil Company
Motor truck with working model hoist displayed. Messrs. Dercksmeir and Hyner in attendance.

Hendrick Manufacturing Company.
Perforated rotary and flat screens displayed with literature. Messrs. Dann and Shoten in attendance.

C. W. Hunt Company, Inc.
Modern piano wire Mitchell vibrating screen displayed with literature and photographs. Messrs. Moore and Smith in attendance.

Industrial Brownhoist Corporation
Literature and photographs of cranes and ball bearing conveyor idlers. Messrs. Beyer and Henault in attendance.

The Jeffrey Manufacturing Company
A model of the X-Tract-Tor car unloader displayed with motion pictures, literature and photographs. Messrs. Francisco and Warren in attendance.

Koppel Industrial Car and Equipment Company
Literature and photographs displayed. Messrs. Dale, Redman and Stewart in attendance.

A. Leschen and Sons Rope Company
Samples of red strand wire rope displayed with photographs and literature. Messrs. Hickok and Walters in attendance.

Link Belt Company
Vibrating screen displayed, also working model sand and gravel plant, photographs and litera-

ture. Messrs. Huntington, Paige, Schifflin and Strube in attendance.

Manganese Steel Forge Company
All sizes Rol-man manganese screens displayed, chute plates and forged manganese steel pins and bushings. Photographs and literature also exhibited. Messrs. Jones, Potter and Morrison in attendance.

The Marion Steam Shovel Company
Photographs and a full line of catalogs displayed. Messrs. Davis, French, Gracely, Howser and Mosley in attendance.

Mead Morrison Manufacturing Company
Capstan and drum type car puller exhibited with photographs and literature. Mr. Redfern in attendance.

Morris Machine Works
A model pump exhibited with photographs and literature. Mr. Milkowski in attendance.

The New Jersey Wire Cloth Company
Screen cloth exhibited with photographs and literature. Messrs. Emerson and Ogden in attendance.

Niagara Concrete Mixer Company
Two double deck and a triple deck vibrating screens exhibited with photographs and literature. Messrs. Hodge, Morrison, Ross, E. L. Wettlaufer in attendance.

The Osgood Company
Photographs and literature exhibited. Messrs. Siff and Smith in attendance.

The Owen Bucket Company
Model buckets, photographs and literature exhibited. Messrs. E. W. Botten and H. W. Botten in attendance.

Pit and Quarry
Recent issues, reprint and Handbook on displays. Messrs. Munday, Massey and Wood in attendance.

Roberts and Schaefer Company
Model of "Arms" horizontal vibrating screen exhibited with photographs and literature. Messrs. Arms and Dooley in attendance.

Rock Products
Current issues displayed. Messrs. Rockwood, Shaw, Sullivan and Wilson in attendance.

Sauerman Brothers
Model plant displayed, also motion pictures, photographs and literature. Messrs. Bartholomae and Tompkins in attendance.

Smith Engineering Works
Models of equipment displayed with photographs and literature. Messrs. Barnes, Jones and Kraig in attendance.

Stephens Adamson Manufacturing Company
Working model displayed with photographs and literature. Messrs. Adamson, De Muth, Escher, and Pierson in attendance.

Symons Brothers Company
Photographs and literature displayed. Messrs. Hudson and Thistlewaite in attendance.

Taylor Wharton Iron and Steel Company
Manganese steel dipper displayed with photographs and literature. Mr. Trainor in attendance.

The Thew Shovel Company
Center Drive of Thew shovels and cranes displayed with electrical device, also literature and photographs. Messrs. Garber and Vliet in attendance.

The W. S. Tyler Company
Full sized electric vibrating screen displayed with photographs and literature. Messrs. Pringle and Reed in attendance.

Universal Crusher Company
Working model crusher exhibited for gravel displayed with literature and photographs. Mr. Dunlap in attendance.

Vulcan Iron Works
Photographs and literature exhibited. Mr. Olsen in attendance.

The F. M. Welch Engineering Service
Photographs, Blueprints and literature exhibited. Mr. Welch in attendance.

Western Wheel Scraper Company
Motion pictures, photographs and literature exhibited. Mr. Smith in attendance.

G. H. Williams Company
Working model of dragline bucket exhibited with photographs and literature. Mr. Swalley in attendance.

Among Those Present

C. A. Adams, Madison Sand & Gravel Corp., Solsville, N. Y.; V. P. Ahearn, National Sand & Gravel Assn.; Washington, D. C.; W. H. Allswede, Hersey Gravel Co., Hersey, Mich.; D. Alexander, Dixie Sand & Gravel Corp., Petersburg, Va.; O. W. Andersen, Pettibone Mulliken, W. H. K. Bennett Co., Chicago, Ill.; J. T. Appleton, General Electric, Schenectady, N. Y.; A. Atherton, Engr. & Contr., Chicago, Ill.; E. D. Bader, Fairbanks, Morse & Co., Detroit, Mich.; G. C. Baker, Greenville Gravel Corp., Greenville, O.; J. R. Bakstad, Bakstad Crusher & Equip. Corp., Chicago, Ill.; S. D. Baldwin, Cincinnati, O.; Bamman, Harding Co., Inc., York, Pa.; F. R. Banks, Detroit Oxford Gravel & Stone Co.; Oxford, Mich.; J. N. Barbeau, Paris Sand & Gravel Co., Paris, Ont.; D. D. Barnes, Smith Engr. Wks., Chicago, Ill.; W. F. Bartholoman, Sauerman Bros. Inc., Chicago, Ill.; H. N. Battjes, Grand Rapids Gravel Co., Grand Rapids, Mich.; H. F. Bauer, Musk River Gravel Co., Zassenville, O.; G. B. Bebout, Musk River Gravel Co., Janesville, O.; B. Becker, Fuller Becker Co., Oxford, Mich.; W. H. K. Bennett, W. H. K. Bennett Co., Chicago, Ill.; B. W. Beyer, Jr., Industrial Brownhoist Corp., Cleveland, O.; F. J. Billeter, Indiana Gravel Co., Indianapolis, Ind.; F. A. Bingham, Northern Gravel Co., West Bend, Wis.; Chas. P. Biesanz, Biesanz Stone Co., Winona, Minn.; A. C. Birnie, Birnie Sand & Gravel Co., Ludlow, Mass.; A. L. Blakemore, Amer. Manganese Steel Co., Chicago Heights, Ill.; J. B. Blanton Sand & Gravel Co., Frankfort, Ky.; W. A. Bliss, Keystone Sand & Gravel Co., Pittsburgh, Pa.; C. H. Bohmer, Ohio River Sand Co., Louisville, Ky.; J. S. Bond, Allis Chalmers Mfg. Co., Milwaukee, Wis.; H. W. Botten, Owen Bucket Co., Cleveland, O., E. W. Booten, The Owen Bucket Co., Cleveland, O., F. L. Bowens, McClain Sand Co., Point Marion, Pa.; E. S. Bowens, McClain Sand Co., Point Marion, Pa.; J. E. Bowker, Birnie Sand & Gravel Co., Springfield, Mass.; Wm. J. Breen, Grand Rapids Gravel Co., Grand Rapids, Mich.; Geo. Brokate, Home Sand Co., Trement, O.; A. M. Brown, Bown

Huffstetter Material Co., Indianapolis, Inc.; W. N. Brown, The Keystone Gravel Co., Dayton, O.; J. C. Buckbee, Pres., Northern Gravel Co., West Bend, Wis.; John W. Bultler, Consumers Sand Co., Topeka, Kansas; Walter S. Bryde, Walter S. Bryde Co., Detroit, Mich.; H. P. Caldwell, Ohio River Sand Co., Louisville, Ky.; E. W. Campbell, Dayton Gravel & Sand Company, Dayton, Ohio; F. D. Campbell, Koppel Sand, Car & Equip. Co., Koppel, Pa.; Bradley S. Carr, American Manganese Steel Co., Chicago Heights, Ill.; John T. Carpenter, Madison Sand & Gravel Corp., Hamilton, N. Y.; J. E. Carroll, J. E. Carroll Sand Co., Buffalo, N. Y.; W. W. Carson, Jr., Texas Sand & Gravel Assn., Austin, Texas; F. V. Chaffee, General Concrete Prod. Corp., Warren, Pa.; M. W. Clark, Stephens Adamson Mfg. Co., Aurora, Ill.; A. C. Colby, Symons Bros. Co., Chicago, Ill.; R. C. Collins, Chas. Warner Co., Philadelphia, Pa.; Rose Collins, Spruce Pine Sand & Gravel Co., Spruce River, Ala.; O. S. Conrades, St. Louis Material & Supply Co., St. Louis, Mo.; R. N. Coolidge, Dravo Contracting Co., Pittsburgh, Pa.; F. L. Comeau, Ray Sand & Gravel Co., Detroit, Mich.; Herbert L. Conlin, Herbert L. Conlin, Toronto; F. D. Coppock, Greenville Gravel Corp., Greenville, O.; J. J. Corman, Greenville Gravel Corp., Brighton, Mich.; Fred W. Cornwelle, The Red Bank Gravel Co., Cincinnati, O.; Robert P. Cortis, Portland Cement Assn., Detroit, Mich.; C. W. Crisler, Potts-Moore Gravel Co., Waco, Texas.; J. V. Cruise, Mich. Highway Dept., Lansing, Mich.; A. W. Dann, Keystone Sand & Supply Co., Pittsburgh, Pa.; B. G. Dann, Hendrick Mfg. Co., Carbondale, Pa.; L. P. Darnell, Cincinnati Rubber Mfg. So., Cincinnati, O.; C. M. Davis, Allis Chalmers Co., Detroit, Mich.; Grant Davis, Marion Steam Shovel Co., Marion, O.; Russell G. Davis, Chain Belt Co., Milwaukee, Wis.; H. S. Davison, J. K. Davison & Bro., Pittsburgh, Pa.; H. M. Davison, The Hayward Company, New York, N. Y.; Wm. H. Demuth, Stephens Adamson Co., Aurora, Ill.; Smeier R. L. Dierck, The Heil Co., Milwaukee, Wis.; P. Y. Dooley, Roberts & Schaefer Co., Chicago, Ill.; L. W. Dunlap, Universal Crusher Co., Cedar Rapids, Ia.; H. Duterman, Jonesville Gravel Co., Jonesville, Mich.; L. E. Duvall, Bellevue Sand & Gravel Co., Bellevue, Iowa; L. J. Dyament, Ward Sand & Gravel Co., Oxford, Mich.; Mrs. L. J. Dyament, Detroit, Mich.; E. J. Early, Beek Road Sand & Gravel Pit, Northville, Mich.; R. W. Eberly, Buffalo Gravel Corp., Buffalo, N. Y.; M. W. Edman, Greenville Gravel Corp.; Brighton, Mich.; V. B. Edwards, The Dravo Contracting Co., Pittsburgh, Pa.; E. W. Ehlert Concrete Prod., Cleveland, Ohio; H. V. Ellis, Ohio & Mich. Sand & Gravel Co., Toledo, O.; J. H. Evans, Arrow Sand Co., Columbus, O.; C. R. Emerson, New Jersey Wire Cloth, Trenton, N. J.; N. P. Farrar, Harnischfeger Corp., Milwaukee, Wis.; W. L. Filer, Royal Oak, Mich.; Flint Crushed Gravel Co., R. C. Fletcher, Des Moines, Iowa; John Franz, J. E. Carroll Sand Co., Utica, N. Y.; G. R. Fox, Page Engineering Co., Chicago, Ill.; Alexander Foster, Jr., Charles Warner Co., Wilmington, Del.; A. Foster, Jr., Chas. Warner Co., Wilmington, Del.; G. D. Fraunfelder, Easton Car & Const. Co., Easton, Pa.; H. E. Fretz, B. F. Goodrich Rubber Co., Akron, O.; F. E. Finch, Hardinge Co., York, Pa.; F. H. Gades, Consumers Sand Co., Topeka, Kans.; M. B. Garber, Thew Shovel Co., Lorain, O.; W. B. Gery, The Dorr Co., Chicago, Ill.; Mrs. J. D. Gillette, New York City; L. E. Ginn, Jonesville Gravel Co., Jonesville, Mich.; A. Goldberg, Allis Chalmers Co., Westallis, Wis.; O. E. Gooding, Standard Gravel Co., New Hudson, N. Y.; R. A. Goodwin, Cement, Mill & Quarry, Chicago, Ill.; H. T. Gracely, Marion Steam Shovel Co., Marion, O.; J. Graham, Paris Sand & Gravel Co., Paris.; F. H. Grant, Greenville Gravel Corp., Detroit, Mich.; R. S. Green, American Steel & Wire Co., Chicago, Ill.; Haarer, J. J., Ray Sand & Gravel Co., Detroit, Mich.; H. Haddow, Jr., Menantico Sand & Gravel Co., Millville, N. J.; D. P. Hall, The T. J. Hall Co., Cincinnati, O.; F. E. Hall, The Ohio River Sand & Gravel Co., Cincinnati, O.; E. M. Hammon, Gravel Prod. Corp., Buffalo, N. Y.; Mrs. E. M. Hammond, Ward Sand & Gravel Co., Oxford, Mich.; G. A. Hanke, Kent Sand & Gravel Co., Grand Rapids, Mich.; J. W. Hannen, Mich. Roads & Pavements, Lansing, Mich.; L. F. Hart, Wabash Sand & Gravel Co., Terre Haute, Ind.; A. Harvey, Eng. & Contr., Chicago, Ill.; E. W. Heath, The Fate-Root-Heath Co., Plymouth, O.; E. E. Hickok, A. Leschen & Sons Rope Co., St. Louis, Mo.; S. C. Hodge, Niagara Concrete Mixer Co., New York City; T. S. Holden, F. W. Dodge Corp., New York City; H. H. Holistat, C. L. Gransden & Co., Detroit, Mich.; E. Holwadel, The Red Bank Gravel Co., Cincinnati, O.; Frank W. Hoff, Greenville Gravel Corp., Lansing, Mich.; C. M. Howser, The Marion Steam & Shovel Co., Marion, O.; J. A. Hunter, Great Falls Const. Co., Great Falls, Mont.; C. S. Huntington, Link-Belt Co., Chicago, Ill.; Chas. O. Hutchins, Wyoming Sand & Gravel Co., Wilkes Barre, Pa.; John Hurlbut, Chicago, Ill.; A. O. Hyner, The Heil Co., Milwaukee, Wis.; C. B. Ireland, Montgomery Gravel Co., Montgomery, Ala.; J. R. Jensen, Janesville Sand & Gravel Co., Janesville, Wis.; V. O. Johnston, Lincoln Sand & Gravel Co., Lincoln, Ill.; V. H. Jones, Smith Engr. Wks., Milwaukee, Wis.; L. W. Jones, Manganese Steel Forge Co., Philadelphia, Pa.; T. K. Keeling, Fate-Root-Heath Co., Cleveland, O.; Keenan, A. F., U. S. Rubber Co., Chicago, Ill.; J. W. Kennedy, Huron Portland Cement Co., Detroit, Mich.; K. E. Kersten, Cincinnati Rubber Mfg. Co., Cincinnati Ohio; P. M. Kingsley, Greenville Gravel Corp., New Hudson, Mich.; H. S. Knight, The Rubber City Sand & Gravel Co., Akron, O.; E. E. Kraig, Smith Engr. Wks., Chicago, Ill.; O. Kuehne, Jr.; Kansas Sand Co., Topeka, Kan.; L. A. Kueuzh, The Eden Gravel Co., Upper Sandusky, O.; H. G. Ladouceur,

Ward Sand & Gravel Co., Oxford, Mich.; C. B. Laird, Eagle Iron Works, Des Moines, Iowa; H. P. Lange, Queen City Sand & Gravel Co., Cincinnati, Ohio; M. S. Lambert, Robins Conveying Belt Co., Chicago, Ill.; Fred D. Lake, F. D. Lake Co., Grand Rapids, Mich.; O. Lamp, Blaw Knox Co., Blawnox, Pa.; A. B. Lampe, Brookville Locomotive Co., Brookville, Pa.; A. C. Leigh, Dravo Contracting Co., Pittsburgh, Pa.; Lenhardt, L. G., Detroit Water Bd., Detroit, Mich.; M. S. Lentz, National Slag Co., Allentown, Pa.; C. L. Lewellyn, Wyoming Sand & Gravel Co., Wilkes Barre, Pa.; M. R. Lewis, Clarence Supply Co., Buffalo, N. Y.; A. E. Lyle, Benzieco, Beulah, Mich.; Oscar Lotz, Carl Lotz Sand & Gravel Co., Paris, Ont.; C. G. Lundgren, National Wall & Steel Co., Cleveland, Ohio; I. J. Lyons, Kent Sand & Gravel Co., Grand Rapids, Mich.; E. A. Macauley, Packard Motor Co., Detroit, Mich.; McDiarmed, R. C., Ohio River Sand & Gravel Co., Wheeling, W. Va.; W. H. McDonald, Memphis Stone & Gravel Co.; Memphis, Tenn.; J. R. McGraw, Ohio River Sand Co., Pittsburgh, Pa.; G. McHoffie, Paris Sand & Gravel Co., Paris, Ont.; S. C. McKee, Truscon Steel Co., Youngstown, Ohio; W. T. McKenney, Macomb Co. Road Co., Mt. Clemens, Mich.; McMath, T. E.; McMath Sand & Gravel Co., Lincoln, Ill.; P. T. Mack, Bucyrus Erie Co., Detroit, Mich.; G. B. Massey, Randolph Perkins, Chicago, Ill.; D. L. Matthias, Mackintosh-Hemphill Co., Pittsburgh, Pa.; E. H. Matthias, Waterloo Dredging Co., Waterloo, Iowa; Mensch, H. E. Harnischfeger Works, Milwaukee, Wis.; G. F. Metz, Hardinge Co., Inc., York, Pa.; H. Migneault, Allis Chalmers Mfg. Co., Milwaukee, Wis.; H. W. Miller, Thew Shovel Co., Detroit, Mich.; J. E. Mills, City of Detroit, Detroit, Mich.; K. A. Mills, Superior Products Co., Detroit, Mich.; V. J. Milkowski, Morris Machine Wks., Baldwinsville, N. Y.; J. J. Moore, Day & Maddock Co., Cleveland, Ohio; J. C. Moore, M & M Sand & Gravel Co., Chillicothe; G. E. Moore, Hunter Mackey Co., Detroit, Mich.; P. S. Moore, C. W. Hunt Co., Inc., Staten Island, N. Y.; J. A. Morr, Jonesville Cement Co., Jonesville, Mich.; J. W. Morton, New Jersey Sand & Gravel Co., Spring Lake, N. J.; L. C. Mosley, Marion Steam Shovel Co., Marion, Ohio; C. F. Mullin, The Georgia Gravel Co., Columbus, Georgia; H. W. Munday, Pit & Quarry, Chicago, Ill.; Perry Nagle, American Manganese Steel Co., Chicago, Ill.; D. W. Newman, New Jersey Sand & Gravel Co., Spring Lake, N. J.; H. W. Newton, The Dorr Company, Chicago, Ill.; N. S. Nicol, Cross Engineering Co., Carbondale, Pa.; H. W. Ogden, New Jersey Cloth Co., New Jersey; H. Olsen, Vulcan Iron Works, Wilkes-Barre, Pa.; John Sankey, Joliet Gravel Co., Springfield, Ill.; J. L. Shiely, J. L. Shiely Co., St. Paul, Minn.; E. Shaw, Rock Products, Chicago, Ill.; B. G. Shotton, Hendrick Mfg. Co., Pittsburgh, Pa.; J. M. Settle, Ohio River Sand Co.; H. H. Siff, The Osgood Co., Detroit, Mich.; L. C. Sitterly, Western Sand & Gravel Co., Spring Valley, Ill.; B. H. Smith, Detroit Oxford Gravel & Stone Co., Oxford, Mich.; C. C. A. Smith, J. K. Davison & Bros., Pershing; B. P. Smith, Western Wheeled Scraper Co., Aurora, Ill.; E. C. Smith, The Osgood Co., Marion, Ohio; F. E. Smith, W. H. K. Bennett, Chicago, Ill.; St. Clair Smith, Jr.; C. W. Hunt Co., Inc., West New Brighton, New York City; W. L. Smith, Memphis Stone & Gravel, Memphis, Tenn.; W. O. Smith, Detroit Oxford Gravel & Stone Co., Oxford, Mich.; E. S. Stadelman, Robins Conveying Belt Co., New York City; C. H. Stanley, Goodwin Callifcher, New York City; H. J. Stannert, Stannert Sand Co., Northumberland, Pa.; J. W. Stamp, Western Sand & Gravel Co., Ferre Hunt, Ind.; E. D. Stearns, Stearns Conveyor Co., Cleveland, Ohio; S. Stepanian, The Arrow Sand & Gravel Co., Columbus, Ohio; A. F. Stewart, Northern Gravel Co., West Bend, Wis.; R. C. Sullivan, Rock Products, Chicago, Ill.; J. R. Thoenen, U. S. Bureau of Mines, New Brunswick, N. J.; E. S. Tompkins, Allen Cone Co., New York City; G. H. Tompkins, Sauerman Bros., Inc., Chicago, Ill.; G. W. Tripon, Fuller-Becker Co., Oxford, Mich.; J. A. Trainor, Taylor Wharton Iron & Steel Co., High Bridge, N. J.; C. W. Van Orman, Lee-Van Orman, Yoakum, Texas; G. P. VanVliet, Thew Shovel Co., Lorain, Ohio; E. A. Velde, Universal Crusher Co., Cedar Rapids, Ia.; Newton B. Wade, Menantico Sand & Gravel Co., Milville, N. J.; J. H. Wagoner, Boonville Sand Corp., Boonville, Wis.; S. Walker, Wabash Sand & Gravel Co., Washington, D. C.; G. T. Wallace, Fate-Root-Heath Co., Plymouth, O.; L. F. Walsh, Goodwin Gallegher Sand & Gravel Corp.; New York City; H. A. Walter, East Aurora Sand & Gravel Co., Buffalo, N. Y.; A. Walters, J. W. Popp & Co., Detroit, Mich.; J. R. Warren, Jeffrey Mfg. Co., Columbus, Ohio; F. M. Welch, F. M. Welch Eng. Serv., Greenville, Ohio; Wenault, P. C., Industrial Brownhoist Corp., Cleveland, Ohio; C. F. Weiblen, G. H. Williams Co., Erie, Pa.; H. E. West, West Sand Co., Muskegon, Okla.; P. G. West, Mead-Morrison Mfg. Co., Boston, Mass.; E. L. Wettlanfer, Niagara Concrete Mixer Co., Toronto, Ont.; R. C. Will, Midland Barge Co., Midland, Pa.; G. H. Williamson, J. K. Davison & Bros., Pittsburgh, Pa.; T. H. Williams, U. S. V. B., Detroit, Mich.; L. E. Williams, Ray Sand & Gravel Co., Detroit, Mich.; G. W. Wilson, Indiana Gravel Co., Indianapolis, Ind.; H. W. Wilson, Durham Stone & Sand Co., Durham, Ont.; W. H. Wilson, Rock Prod., Chicago, Ill.; C. E. Wood, Pit & Quarry, Chicago, Ill.; P. A. Yager, River Sand & Gravel Co., Owensboro, Ky.; R. C. Yeoman, Construction Material Co., Chicago, Ill.; C. M. Young, Cincinnati Rubber Mfg. Co., Indianapolis, Ind.; J. L. Young, Timken Roller Bearing Co., Canton, Ohio; E. Zimmerman, The Ohio Gravel Ballast Co., Cincinnati, Ohio; W. L. Evans, Hunter Mack Co., Detroit,

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VALUE OF ASPHALT FOR PAVING

By J. S. Helm
President, The Asphalt Association*

NOT so long ago, road building was largely a question of locating a road to avoid bad grades, putting in suitable drainage, bridging streams, and if surface was needed, of spreading gravel or crushed stone. Today there is a very highly developed technology involving extensive research, exact application and a consideration of the effect of climate, traffic, soil conditions and other factors, in designing and building modern pavements.

It was in a spirit of service and with realization of the necessity for intensive study and discussion that the asphalt industry in 1922 took steps for holding an annual paving conference. These conferences have brought together the best trained highway engineers and the most practically experienced men in the asphalt paving industry who by exchanging their knowledge and experience are advancing the practical interests of the American public through improving the quality of pavements and making known the conditions under which the greatest economy and service can be obtained. Let me emphasize that these paving conferences are in no sense annual meetings of the asphalt industry as we are laying aside our problems in order that the fullest scope may be given to the questions of asphalt research, construction, maintenance and economics, with the freest and most untrammelled discussions by engineers, officials and contractors.

Within the past two years asphalt technology has received tremendous impetus through the formation of the Association of Paving Technologists with motives wholly unselfish and whose personnel embraces the finest technical minds in the organization is, jointly with the Asphalt Association, holding this convention.

Asphalt is one of nature's products and just as man has taken from bounteous nature the gold, the silver, the iron ore, the coal, petroleum, copper and the other products which have served his economic needs so he is obtaining as a boon to transportation one of nature's most useful treasures in the form of asphalt.

This product is not a creation of the synthetic chemist nor a by-product but is a natural material originating in petroleum and held in solution by it, no matter where or in what form it is found, and it is a fact that today 94 per cent of America's asphalt requirements are obtained from the oil refineries. Asphalt is a material which enters into the manufacture of more than two-thirds of the entire roofing of America; a material which enters directly into a larger yardage of pavements than any other binding material; a product which is practically necessary not only in asphalt pavements but in almost every other form of pavement, and it is a product which is the one supreme salvaging medium to which we must look for saving our two to three billion dollar investment in macadam and gravel roads, through the application of a smooth, durable, dustless, water-proof wearing course.

We are a rich nation, but since the white man first stepped foot on the American continent we have been wasteful. We cut down our forests, we wore out our farm lands, we are prodigal with our petroleum supplies, and now that we are spending literally billions of dollars in building highways, it is to my mind a very justifiable warning to save our pavements and not go on forever building roads and tearing them up to build new ones just because we have the money.

I believe that every dollar wisely expended for good roads is an investment, but I can well understand the concern of many of our students of governmental science at the rapidly mounting tax burden incident to the operation of government. Much of this tax burden is directly attributal to building roads and streets, and if we can conserve that investment so that it is comparable with the outlay of a private citizen for building houses, we merely transfer our funds from private into public investments and lose nothing. If these outlays are to be repeated year after year by substituting one pavement for another, then we are directly headed for a financial catastrophe. Rich as we are we cannot afford to waste any of our investment in streets and highways.

There is some justice to the contention of many railroad executives, that the bulk of our highway expenditures is being directed into building parallel trunk lines, costing as much or more per mile as railroads, and actually competing with them for passenger and freight traffic. Too little attention is being paid to the lateral roads which run from out in the farm communities to the railroad station which must be used by the farmers in bringing products to shipping points. It is true that these secondary and radial roads do not require costly improvement, but they should get a larger share of the highway program than they receive.

*Abstract of address presented at the Sixth Annual Asphalt Paving Conference, Atlanta, Georgia, November 28, 1927.

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Mich.; C. Hoolihan, The Keystone Gravel Co., Dayton, Ohio; O. Kuehne, Jr., Kansas Sand Co., Topeka, Kansas; L. A. Kuezh, The Eden Gravel Co., Upper Sandusky, Ohio; O. W. Knight, River Sand Co., Topeka, Kansas.

PROFITLESS PROSPERITY

By E. St. Elmo Lewis,
Counsellor In Trade and Consumer Relations, National Service, Inc.*

BUSINESS in many lines is in a peculiar position. There are entirely too many companies that are not making any money. Many companies are actually losing, while there are comparatively too few that are making a profit.

When we attempt to analyze from the available figures, we find a considerable divergence because of a lack of standards that give us a common denominator by which to make comparison. But there was never a time in the history of industrial America when there was less room for the ineffective organization. The significant thing is that such organizations as United States Steel and General Motors are making money, and the smaller organizations that are making money have some characteristics in common with a great corporation.

The great corporations making the large profits like General Electric, General Motors, United States Steel, and their counterparts in other industries, are organizations that have placed themselves in a position to directly benefit by the application of the latest scientific knowledge to either the problem of production or sales or to both. I shall dwell on this phase of research, which is involved in the statement I have just made, later on in what I have to say to you.

On down through the line of all branches of industry we find the big outstanding, consistent profit-maker in each line of industry, commerce or business, doing substantially the same thing and benefiting by the same favorable items.

The day of the small concern that persists in thinking small about the big things of industry is rapidly passing away and the big industry with its rapidly developing tendency to place a premium on brains rather than mere money or mechanical equipment is becoming stronger and greater as the days pass.

Great financial resources do not make a concern big in the sense in which I speak of it here. The only advantage great financial resources give to a great organization is the power it gives it to buy experience and brains and skill and to take full advantage of the latest developments in its industry or line.

Within the past five years the fore-thinking men among the smaller organizations have realized that in union there is strength, and we have seen during the past ten years that an industry that has become conscious of itself under the leadership of men who realize that co-operation was the modern cure for combination—that if 500 concerns got together and co-operated in those essential things which made great corporations great; that is, pooled their knowledge and skill and resources for the purpose of increasing their knowledge and skill —they could exercise irresistible force in the determining tendencies of the industry.

The industrial tendency of the day is towards combinations into great units. The only way the single great unit can be fought is by the association of large number of small units.

That association will amount to little, however, if the members do not realize that they are associated for the purpose of doing for each other what the large unit does for itself. I mean that the association should furnish the superstaff of able, experienced technicians in finance, sales, production which every great corporation has on its payroll, and it is this staff that is largely responsible for its bigness and power. It is not the plants, in number or size; it is not its money strength alone—but it is these plus the directing minds that use these implements of war and progress in the industry.

There is a fundamental principle in military tactics that if you can induce the enemy to split into many small units while retaining your own force in the large unit, you can whip an army in details which you could not possibly defeat in mass. An industry might very well learn many things from the tactics of war. If, therefore, the units in an industry such as yours become profoundly conscious of their common problem they can do many times that any one of them could not do by itself. I shall endeavor today to take up some of the very definite things you can do as an organization for the common good.

Not so long ago a popular writer used the phrase which appears in the program as the subject under which I am to say a few things to you this morning about the sand and gravel industry. The phrase fairly reflects, if somewhat biting in its humor, the phenomenon of our present industry situation.

The members of your Association, I am informed, have not been immune to the profit effects of our profit eating prosperity.

I have been studying many of the conditions surrounding your industry—read some of your committee reports—talked with representatives of organizations who are users of your product.

I trust that you thoroughly understand that I do not presume to come to you with any panacea for whatever ills, imaginary or real, from which this industry may, in the opinion of some, be suffering. May I ask you to think of me as coming

*Presented Before the National Crushed Stone Association at Detroit, January 6, 1928.

here as an interpreter of the progress made by other associations representing other lines, yet having problems similar to—sometimes exactly like to your own.

In the past year I have talked in convention, or sat in conference with many trade associations. I have talked to the Structural Steel and Reinforced Concrete Associations with respect to their specific problems. I mention them because they are catering to groups who are large consumers of your product and are affected by many of the same problems that affect you.

But let me state my position relative to yourselves and your problems. My very position as an outsider may be the best of reasons why I may talk to you.

Daniel and Jethro

It may not be inappropriate for me to ask you for a moment to recall your Bible studies. As a matter of fact my position as interpreter and counsel has a rather long history. If you have read the June, 27 issue of your Sand and Gravel Bulletin you will remember the address of Mr. Arthur D. Little before the American Institute of Chemical Engineers. In his talk, you will remember, he referred to that dramatic story of Belshazzar's feast. Belshazzar sat feasting with his thousand nobles in the great city of Babylon. The banquet was at its height when suddenly against the wall appeared the fingers of a hand which wrote on the wall above the great candlestick the momentous legend in a strange tongue and in which Daniel read Belshazzar's doom after soothsayers and astrologers and the genial yes-yes men who surrounded Royalty had failed to make interpretation.

Daniel was an interpreter of signs and portents, and while his interpretation in this particular case was not very pleasant, at the same time he interpreted and the king was forewarned.

The Bible has another story that is pertinent thought not so tragic in its import. You will remember when Moses led the Children of Israel out of Egypt for a brief time he was camped on the Hill of God, where Jethro, his father-in-law, came to visit him. One day Moses invited (so the story goes in Exodus 18) Jethro to sit with him while he held popular court in the midst of the tribe. It took him all day listening to big and little, important and trifling cases. Then after they adjourned, Jethro, who had been much impressed, said to his son-in-law, "Why sit alone as a Judge with the people all around you from morning to night?"

Moses explained.

Jethro then told him he was wasting a lot of time, working too hard, wasting his skill and judgment and ability on too many minor things when he should be occupied in the much more important work of larger administration. Then, like a good counsel, he told him how it could be done—by the simple organization of his people into groups of 10, 50, 100 and 1000, giving each group its own judge. Then Moses would get only the most important cases which these judges could not handle.

Moses accepted this counsel in organization and as the Bible says — "Moses listened to what his father-in-law said and did exactly as he told him."

Jethro was the first counsel in organization that I have any knowledge of. It might be well to call your attention to the fact that Daniel could interpret to a king even if he wasn't king, and Jethro could counsel even if he hadn't led tribes through a wilderness. Both were outsiders in every sense of the word, and yet they performed an office that is recognized as being important.

An investigation of 100 concerns showing that only 9 per cent of the sales managers had been developed in the business.

Less than 2 per cent of the advertising managers had been with the company over three years.

12 per cent of the general managers had been trained in either the company that employed them, or a part of the industry. 17 per cent had been in the industry over five years, and less than 8 per cent over ten years.

It might be interesting to find out how many of the managers of successful sand and gravel concerns were born with sand in their ears; but who, in fact, came into it from other, and entirely different, lines, with new ideas and suggestions that made for the betterment of the business.

If you have not read Mr. Little's address in its entirety I commend it to you. It is good for the soul of those who sit down to feasting, and is explanatory of the peculiar fact about most of the great leaders in industry, that when all people are full of optimism, they are quietly and shrewdly looking for signs of a coming storm, and when all the people are depressed and gloomy in the "blue days," they are just as calmly preparing for the sun that they know is beyond the clouds.

Your Position

Your part of a building industry which stands second in volume in dollars and cents among the industries in the United States—I am informed the Sand and Gravel industry represents an investment of $500,000,000—that your tonnage produces from 6 to 7 per cent of the gross revenues of the carriers.

You are not making money—or, if you are, you are not making enough.

I know, of course, your "business is different." Everybody tells me that. Every line of business tells me that. That is the reason why you are different kind of men (you can tell a Sand and Gravel man by looking at him!). That is why you have no costs, depreciation, absolescence, no selling problems, no production problems, like all other businesses have. Yes, your business is not different! I have heard that "different" talk for forty

years from over 400 lines of business—and it has always ended by learning how much alike business is—then we learned something.

Let's take a look at things for a moment. Let's take a look at ourselves as business men—and then at the tendencies of the hour. For one thing—the opinion of economists is that the price level in general will continue to decline. That means as prices go down a temporary increase of demand, and that they will ultimately stabilize on the basis of the costs of the efficient operators—at a lower level—where only men who can produce at low costs, sell at low prices and make money.

Many times men seem to get lost in the maze of detail in their own business. That is the reason why the most successful managers get away from the desk in order to give themselves a chance to take an airplane view of the whole thing. I have had an opportunity during the past 30 years to study many scores of executives at work. They have been big as well as little men: very great success—the so-so kind who play hide-and-seek all their lives with the red-ink—and the fellows who are chronic red-ink men.

I have seen enough of them to recognize certain ear-marks of each kind.

The big man who has achieved the habit of success never shuts the doors to Ideas, Experience, Knowledge, Skill—no matter from whence it comes nor how strange, nor how unwelcome it is. That new idea account with him is never closed. He is always searching for new things. He organizes to find them for the betterment of his administration, production, financing and sales. He organizes departments, laboratories, testing bureaus to search, find and test New Ideas. The big man is thus more concerned about the future—about where he is going—than where he has been. He knows that the man who is taking care of tomorrow has taken care of today, and only the past will take care of itself. These men are hard-headed.

The second type—the so-so man—wants to leave well-enough alone. He is impatient of New Ideas. He squelches the innovator. He copies the advances of others and is always, even at his best, hanging on to the coat-tails of progress. He saves the cost of research—he considers scientific men high-brow theorists. He is rather cynical about such things. He thinks he can alter facts by sales talk. He scoffs at laboratories—sneers at standard cost systems—and hopes some way can be found to fix prices at a level where he can make a profit.

The third type is the man who quickly fades out of the picture when the high price, large profit era passes. At all times he is the great disturbing, uneconomic, dangerous factor in any industry. He is a theorist, of the worst type. He has a theory that he can guess himself into a profit.

In your industry he refuses to join the Association. He thinks the big fellows want to get him in so they can trim him. He sells sub-standard products. He resorts to unethical procedure handling complaisant contractors, architects and engineers.

He cuts prices. He always cuts.

He is a problem of education, because no industry can get far toward stabilization until he gets in line with fundamentals.

Every industry I have studied has these three types of operators. The problem is—can they be equalized upward?

The solution is one of education. There is the education by the process of showing them the advantages of following the practice that succeeds. This can only be done by demonstrating and comparing the success of right practice and the failure of wrong practice. Then there is the more drastic education. By passing on to the Consumer a fair share of the savings made by right methods, the successful concerns make the failure of the wrong-headed operator more quickly certain, and at the same time stabilize the industry.

By educating the Public to buy the right material, handled in the right way, the methods of the inefficient operator are, if not immediately nullified, made increasingly unprofitable.

Briefly, that is the foundation policy on which successful industries are handling the problem of these types of managers who refuse to play the game according to the rules.

There is a new principle at work not only in production and in accounting, but in sales as well. Scientific fact-finding is taking the place of "by guess and by God."

Recently in transmitting a report on Markets made to 198 New England manufacturers, Mr. James L. Madden, vice-president of the Metropolitan Life Insurance Company, reflects the principle on which modern business is working:

"—The old, intuitive method of determining business policies is gradually being replaced by factfinding because modern business has become too complicated for guesswork or for rule-of-thumb methods. Progressive business has lifted a page from the experience of science and there is a growing realization that the formulation of successful management policies must be based on the accurate and thorough collection, organization and interpretation of facts. It is not surprising, therefore, to find a definite trend among progressive employers to supplant opinion, as a basis for business judgment, with fact-finding.. As a result, the executive has essential facts which deal with the internal structure of his business, as well as information on external economic data which, directly or indirectly, may affect his operations."

We Can't Depend on Hunches, Guesswork and Inspiration

When everybody uses the same set of old facts, uses them in the same way, they generally get the

same result within very narrow limits of variation. But when some fellow gets at new facts, handled with new Ideas, and in a new way—then the disturbance begins.

When Radio came into general use several years ago—the phonograph business dwindled so fast that the largest unit, the Victor Company, had to pass dividends before it could "dig in." The Victor had been a big dividend payer for years. One year it paid a 600 per cent. stock dividend.

In 1925 the phonograph industry was on the toboggan. Today it has regained its lost ground. What worked the revolution?

Scientific research—a few high-brow engineers working in a laboratory—probably none of them ever made any part of a phonograph or ever sold one. But they "saved the bacon" of the Victor Company.

The Victor Company re-established itself.

* * *

In 1925 the reinforced concrete industry cut into the structural steel field, displacing 600,000 tons of steel construction. Why? Because cement had been for years carrying on research work for the purpose of increasing the use of cement. The cement manufacturers have one of the largest funds for market research, propaganda and advertising among all the industries in the country. They got at it scientifically.

Steel was in the hands of production men. They looked upon their product as a fundamental necessity—people had to use it. But cement proved a substitute.

Steel has wakened up.

The structural steel people re-organized their association under the management of my old friend and former associate, Charles F. Abbott, and is staging a comeback. With over 98 per cent. of the total structural steel concerns in the country (mark the percentage) the Institute of Steel Construction is advertising to consumers (the owners of structures); carrying on educational work among its members, helping to train their salesmen; reformulating the steel sections of municipal building codes; educating engineers, contractors, architects; and working, as an industry, with Public Service and Building Commissions.

It is functioning as a sales as well as an engineering department for the industry.

The day of personal pull, as an exclusive method of building a business, is passing. Personality must have the goods—and the scientific man is determining what the goods shall be. That is the way to guild good will.

I might take the rest of the day to tell you stories of industries that are passing out of the "hunch" and guesswork era into that of the fact era.

Just a superficial study of the work of the Portland Cement Association, which stands in such intimate relation to your own industry—and I am glad to know that Mr. Allan has told you of the results of his Association's work—will open your eyes to the possibility of careful, scientific study of the technical application of a commodity to a market's possibilities.

Please note that I say—"market's possibilities," because there, too, the cement people have applied scientific methods, to determine the possibilities of their markets. They have discovered entirely new uses for cement—thus broadening the demand.

No hunch or guesswork there.

Hunch and guesswork is being cut out of the rubber industry. Rubber has become an important competitor and substitute for leather. Scientific research has cut the price of rubber from $3.00 to $1.00 or less per pound—and it has sold for as little as 17 cents. Research has made great strides in handling rubber from the trees to the tire.

Why am I talking so much about scientific research? Because you are not going to be immune to the tendencies of this scientific age.

The engineer is going to make more great changes in handling your product. He will cut costs. The chemist is going to make great changes in the standards governing the use of your product. You men who have been in this industry since 1910 only have to compare the things you did then, and the product that found a ready market then, with your research engineers' reports in Bulletins 1 and 2 on Aggregates and on Estimates, as well as Bulletins A B C, to realize the changes that have come.

They are but the promise of even greater changes. It requires no great vision to see the day, and it may be here all too soon for some, when present plants will become obsolete, and beds that are today profitably productive will become unproductive because the improved standards will make them so.

Research is the price of stability.

I have shown how greatly it may affect an entire industry in the case of the phonograph, and in the case of structural steel.

Research is the price of Progress.

I have shown this in the case of rubber. It might, with even more force, be shown in the case of fertilizers, artificial silk, dyes, building brick, coal, oil, gas, copper, paints (look what the nitrocellulose developments have done to paints).

Again I ask you to think what research has done for you through the work of the Portland Cement Association.

Researching Markets

So far I have asked you to think of the value of the results of scientific investigation of the methods of producing the product, and of standardizing it—to meet market changes.

For a few minutes I want to ask you to con-

sider a newer phase of the application of the scientific method—to the study of markets.

The man who doesn't know where his market is going—can't control profits—I think that is self-evident.

We used to think we knew all about our market—just because we sold it.

We are finding that we know too little.

We don't know where all the profitable markets are.

We don't always know where the unprofitable market is—until we lose a lot of money trying to cater to it.

We don't know what new demand may be developed until it is actually buying; or it lies undeveloped for a colorable substitute to develop it.

We don't develop our markets at the least cost.

We don't find out the facts about the buying habits of our customers and prospects, but let our salesmen guide us the easiest way for the salesman.

We don't know the real facts about the necessity for price cutting—depending entirely too much on the word of unprincipled buyers, and weak salesmen.

We don't reach the ultimate consumer with enough direct educational material so he can intelligently pass on the recommendations of his architect and contractor with reference to our product.

Time will not let me go into all of these.

It would pay your Association to carry on a market research on each of these definite problems. The results would eliminate many bad policies and practices.

Consider the investor who builds. Every day you estimate on specifications only to find that the architect and contractor has induced the owner to accept sub-standard material as "just as good."

The Aggregates are just as important as the cement. In many cases a proper mixture, I am told, will save enough on the cement to pay twice as much for the Aggregates—and get a gain in the strength of the concrete.

But who knows it? Why keep that fact a dark secret? Who is most interested in that? Is it not the owner and yourself?

Why not tell him?

Your industry as a whole, no matter what may be the interests of the producers of sub-standard material, or other industries, must always be on the side of the real interests of the users of your product. As you raise the standard of value to him you can raise the price, or at least get a profitable price.

That is fundamental.

But you must educate the owner. In order to do that you must find out what kind of a person he is—how he thinks—what he thinks about your product—if he is thinking right about it—and where he is and how many there are of him.

If you do not know these things about your Consumer—your ultimate Consumer—you don't know much about your market. You are, without these facts, at the mercy of your contractor, architect and dealer.

Your section of the country may be prosperous but you cannot take full advantage of it, unless you know the condition.

Market research is one of the modern activities of all highly successful big organizations and industry. It fixes sales policies.

After an analysis of the market, a large metal furniture organization switched its sales accent from big contract equipment sold to contractors, to standard office equipment sold through dealers. Result—stabilization of both volume and price and profits.

After an analysis a ball-bearing manufacturer investigated the market, and shifted the sales accent from automobile equipment to industrial equipment and replacement. Result—stabilization of volume and profit.

The steel research laboratories, the American Welding Society and the electrical manufacturing companies are developing the welding process so it can be applied to buildings. The machine gun riveter will be eliminated, new conditions of operation will follow. Same may affect you. Do you know?

Market research will show you the drift of demand—before it appears in sales. Everybody in the research department knew that Mr. Ford would have to scrap the Model T three years ago.

Chevrolet has announced its new model within 30 days of the new Ford, and in the meantime has been producing and selling its old model.

Research anticipates changes.

The Consumer in the long run dictates what will be done. Long before the sale, the Consumer is unconsciously developing what he wants. The intelligent marketing man is constantly probing for these tendencies which guide and control the market in the making.

It is the job of the Association to anticipate. It is your part to place in the hands of the Association the funds and organization to anticipate the trends of the market, and thus prepare you to make a profit out of prosperity.

But research is not enough.

It is not enough that you accept and adopt the new Ideas. The public must want what you produce: they must want the new things.

The public must tell you what it thinks. It must be interpreted to you. You must be interpreted to the public. It requires more than the ordinary advertising message. That will not suffice.

The research results need interpretation—the process by which the results and their value are

explained to the laymen. It is the lack of proper interpretation that makes so many Government Reports of so little value to the layman.

Not so long ago I had an executive hand me three large volumes of reports from Auditors, with the remark—

"I wish you would go over these and tell me what they mean—what I can do with them."

As Glenn Frank, President of Wisconsin University, recently said:

"The future of America is in the hands of two men—the investigator and the interpreter. We shall never lack for the administrator, the third man needed to complete this trinity of social servants. And we have an ample supply of investigators, but there is a shortage of readable and responsible interpreters, men who can effectively play mediator between specialist and layman. The practical value of every social invention or material discovery depends upon its being adequately interpreted to the masses. Science owes its effective ministry as much to the interpretative mind as to the creative mind. The knowledge of mankind is advanced by the investigator, but the investigator is not always the best interpreter of his discoveries. Rarely, in fact, do the genius for exploration and the genius for exposition meet in the same mind.

"Many Negro Mammies of the South can make a strawberry shortcake that would tempt the appetite of the gods, but they might cut sorry figures as domestic science lecturers. The interpreter stands between the layman, whose knowledge of all things is indefinite, and the investigator whose knowledge of one thing is authoritative. The investigator advances knowledge. The interepreter advances progress. History affords abundant evidence that civilization has advanced in direct ratio to the efficiency with which the thought of the thinkers has been translated into the language of the workers."

The Sales Engineer Emerges

During the past five years great changes have occurred in the sales field.

A new type of sales-merchandiser has developed; he is called a sales engineer. To some, educated to look upon the salesman as an irresponsible, inefficient personality who has no use for a profit-and-loss statement and who is incurably negligent of the niceties of scientific formulae and procedure, to call a man a sales engineer is a conflict in terms. But he is here. By using the word "engineer" to include the sales manager who uses a scientific method in analyzing problems of sales, we have the sales engineer. I know the dangers of generalization, but I am on safe ground in this, because industry is full of proof. Up to recently, the salesman has not been an engineer, while the engineer has rarely been a salesman.

What do we see as a difference? A difference between the typical salesman and the typical engineer?

I would answer, in their differing attitudes toward the human factors that enter into the problem of sales.

You cannot build a business on a theoretical abstraction. Life is not so simple. Human feelings, ignorance, caprice, intelligence, understanding, play as decisive a part in your industry as they do anywhere else.

In other words, it appears that we must learn a lot about the most human of business functions—selling—and salesmen need to study the fact-finding methods of the engineer (or accountant), if we would control our sales effort efficiently.

Science Comes Into Selling

Times have changed, and they are going to change more rapidly and in greater degree. Consumers are demanding changes. Sales cost too much. The engineer and accountant have been sent into the sales department in order to find out why the truth about values was so often ignored by the public who followed the persuasive salesman, buying other less valuable things—because the salesman knew the public, and could lead it.

The old type sales manager has sensed a problem, too. He persuaded people to follow him, but he was not always selling the right thing at the right time. He is now finding that he has to study things as well as people. In many lines sales costs have risen beyond all records, and wiped out the factory savings of production experts. Production costs have decreased 20 per cent while sales costs have gone up 300 per cent.

So scientific methods have come into sales—by which the right thing is determined and the right people are led to accept the right thing—and thus the right thing finds its pre-determined market, the market which belongs to it.

This sounds simple, as it is, but the method by which it is accomplished is complex, because mankind is complex.

Let us assume, for the purpose of our talk, the work of a 1927 variety of sales manager who is a leader of men—a developer of their capacities—who has faith in his commodity and the job; i. e., knowing both better than the buyer knows either. He believes in his product and his company, and knows where, why, when, what and how it can be used to the greatest profit to the buyer.

You will have to fill in a lot of this picture from your knowledge of your special conditions.

The sales manager must not blink the personal side of the problem of sales.

The salesman has often been a politician and glad-hand artist, who trusted to a friendly "pull" with his customer, who knew little about the real merit of the goods he sold.

(*Continued on page 98*)

CONSTRUCTION OUTLOOK FOR 1928

By Thomas S. Holden
Vice President, F. W. Dodge Corporation*

BUSINESS men usually look upon economics as a bunch of generalized abstractions, having very little to do with their own affairs, forgetting, perhaps, that every day they are dealing with problems of production and transportation and buying and selling and making profits, all of which are fundamental economic problems. They usually consider statistics as very dry tables of figures, sometimes made lively by pictures of snaky-looking curves that are supposed to show something important about the gold supply of Czechoslavia, or the price of potatoes in Ireland. But they are very considerably interested when you show them a table of figures representing a record of their own sales, or a chart showing the growth of their own business volume since the war. Generally speaking, anything that pertains to our own business, whether it be a business principle, an economic fact, or a table of figures, is interesting. It is only when the economics or statistics apply to some other fellow's business, or when they are stated in such general terms that we do not immediately see that they apply to our own business, that economics and statistics are uninteresting.

But, business men in every line are becoming more and more willing to make the effort necessary to visualize general economic principles and business information embodied in statistics. It is an era of change. The things that apply to one's own business today may be old-fogey ideas tomorrow. We have to keep our eyes and ears open as to what other kinds of business men are doing, and we have to study very carefully all the information we can get about business methods and business principles and business statistics. We want to know what is changing and the direction in which the changes are leading us. We want to know just what is fundamental and not subject to change at all.

If you wanted to know what makes an automobile go, it would be a very good plan to study what happens to the gasoline as it flows from the tank through the feed pipe, the carburetor, the cylinders and the exhaust pipe. If you did that you would have a fairly good working knowledge of the fundamental principles of automobiles. Money is the fuel that makes the business machine go. If you trace the flow of money through the different parts of the business machine, you will know something about the way the machine works.

The money that goes into construction work of any kind is investment money, either saved or borrowed capital. This money is spent for construction materials of all kinds and for wages of construction labor. After these transactions have been made, the money is no longer capital. It has become a part of the general fund of purchasing power and is used to buy every sort of merchandise that the contractors and the subcontractors and the architect's assistants and the material-men's employees and the building laborers may happen to be spending their money on at that particular time. So, in the economic sense, construction activity has a double-barreled function. It manufactures permanent improvements and it transforms capital into spending money.

These are fundamental facts, and they are important to you. If construction money is investment money, then we should look to the conditions of investment markets for signs, favorable or unfavorable, of what the future trends of construction are likely to be. When increasing amounts of money are flowing into investment securities of the class that finance improvements, when interest rates are low, or, what amounts to the same thing, when bond prices are high, we can usually look for increased construction activity to follow. Then, carry this through the next stage. When you have had an increased volume of construction contracts, and when the construction money begins to be spent for all kinds of general merchandise in the community, you will expect business men to tell you that business is on the upgrade and that the community or the country is prosperous.

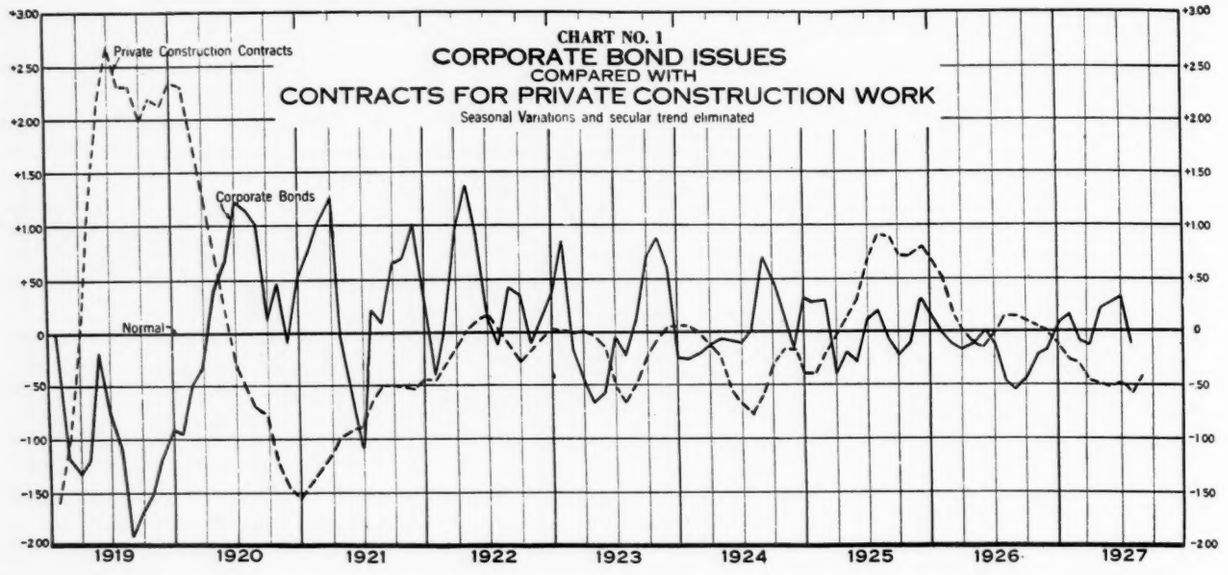
All this sounds well as a statement of general principles; but how does it work out in fact? Here is where the statistics come in. The Statistical Division of F. W. Dodge Corporation has recently worked out and published a set of charts that trace the flow of money through three successive phases: investment, construction contracts, and general business transactions. These charts I am going to show to you now.

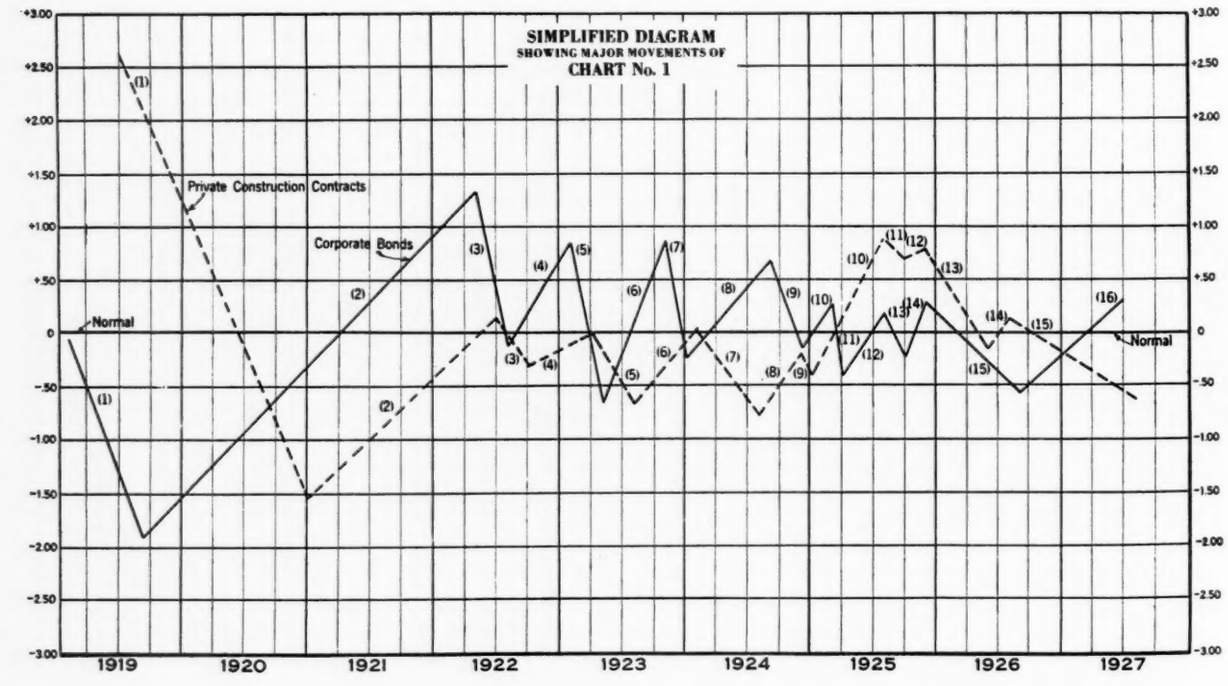
In working out this problem, it was found advisable to divide construction into two big classes, in accordance with the sources of the funds invested in these building and engineering enterprises. The first group we have called Private Construction; it consists of all kinds of building and engineering work financed out of private funds and constructed for income or profit or the immediate use of the owner; it includes all kinds of commercial, industrial, and residential building and construction work. The second group we have called Community Construction; it consists of all classes of building and engineering work financed out of public funds or donations and constructed

*Presented before the National Sand and Gravel Association at Detroit, January 5, 1928.

for general welfare and improvement purposes; it includes schools, hospitals, churches, public buildings, public engineering works, and community enterprises of every sort.

The first chart compares the figures on corporate bond issues with figures on Private Construction contracts. The figures on bond issues cover domestic issues only, with refunding issues omitted. They represent investment funds available for permanent improvements, the class of funds that goes into new building enterprises. The curve is seen to move upward or downward several months in advance of the corresponding up or down movement of the curve of contracts for private construction. It should be explained that all of these charts were made by a fairly elaborate method





A word of explanation may be necessary with reference to the upward bond movement designated as (2) in the diagram appended to Chart No. 1. In the chart this movement is very irregular. However, since the secular trend values for the early period were low, the irregularities are actually considerably magnified here. This extreme irregularity tends to disappear after the post-war deflation period is completed.

STATISTICAL SOURCES.

The Commercial and Financial Chronicle

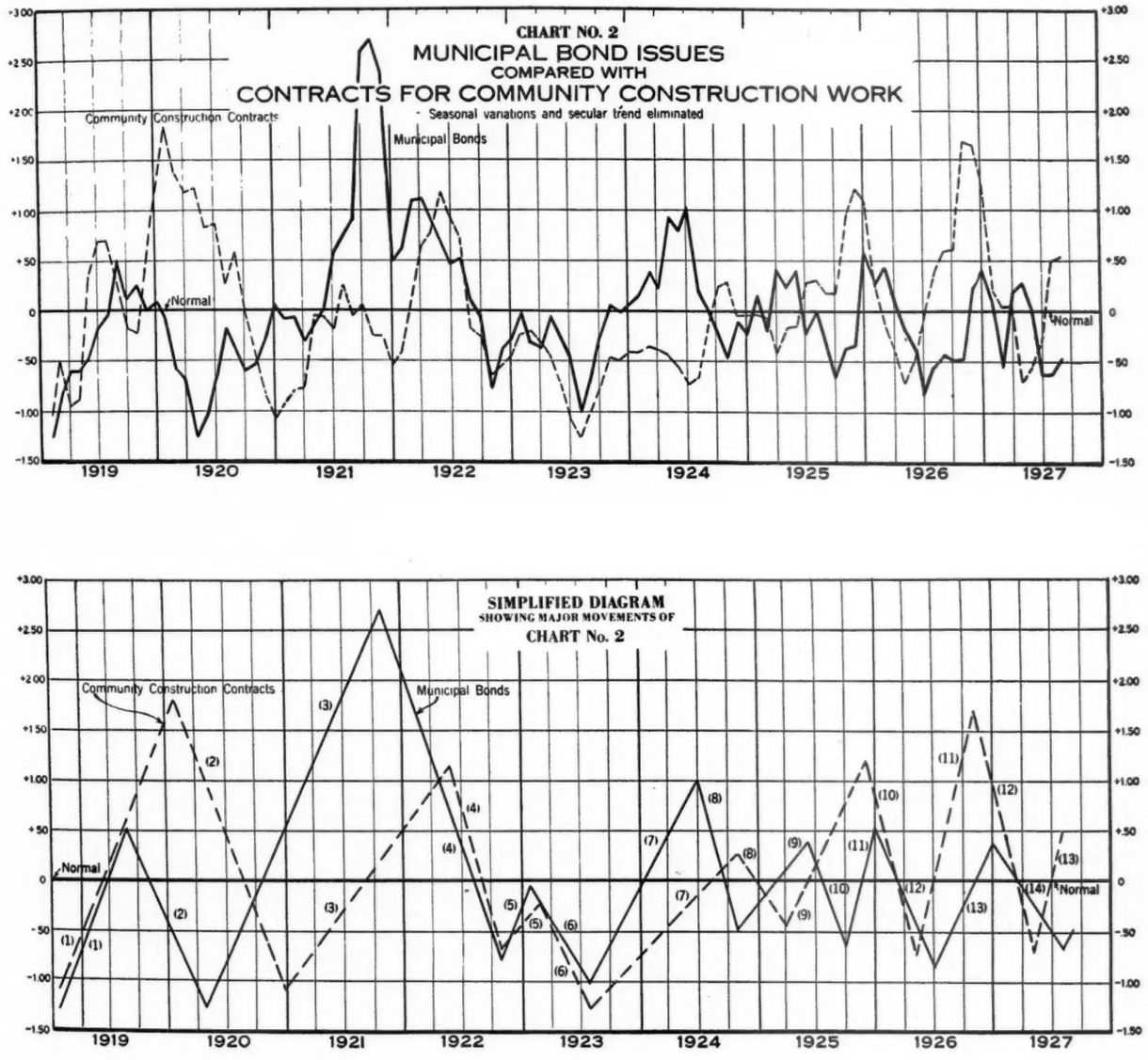
The Bond Buyer

The Survey of Current Business

F. W. Dodge Corporation's Construction Contract Statistics

which fully removes all seasonal fluctuations and also discounts the normal growth, or "secular trend" as the statisticians call it.

Chart No. 1 shows us that the curve of corporate bond issues is a very good forecasting curve pointing in advance the way the contract curve is likely to move. Private construction contracts have been falling off ever since the latter part of 1925. Last year expenditures for this class of work were 6 percent under the total 1926 expenditures for private work. That is why the published reports of building permits have shown such a serious falling off. Building permits cover private work and almost nothing of the other class. The bond curve has been moving upward, with some slight irregularities ever since September, 1926. It is just about time for this increase in investment money to produce an increase in contracts for private con-



Municipal Bond Issues and Community Construction

The chart designated No. 2 compares the movements of municipal bond issues with those of contracts (dollar totals) for community construction projects. Under chart No. 2 is a diagram showing the movements simplified. While the tendency is for the bond curve to anticipate the contract curve, it is to be noted in the 1922-1923 period that the turning points of the two curves are simultaneous in several instances. The final downward movement of the bond curve, designated as (14) in the diagram, is actually an irregular movement which may not yet be completed. *Reference to chart No. 2 at this point serves to show that the upward movement of community construction contracts may not yet be complete; or, possibly, that if any downward movement is on the way, it is likely to be an irregular one which may be interrupted before it becomes serious.*

struction. This chart says there is a very big probability of increased private construction work during a fairly considerable part of 1928.

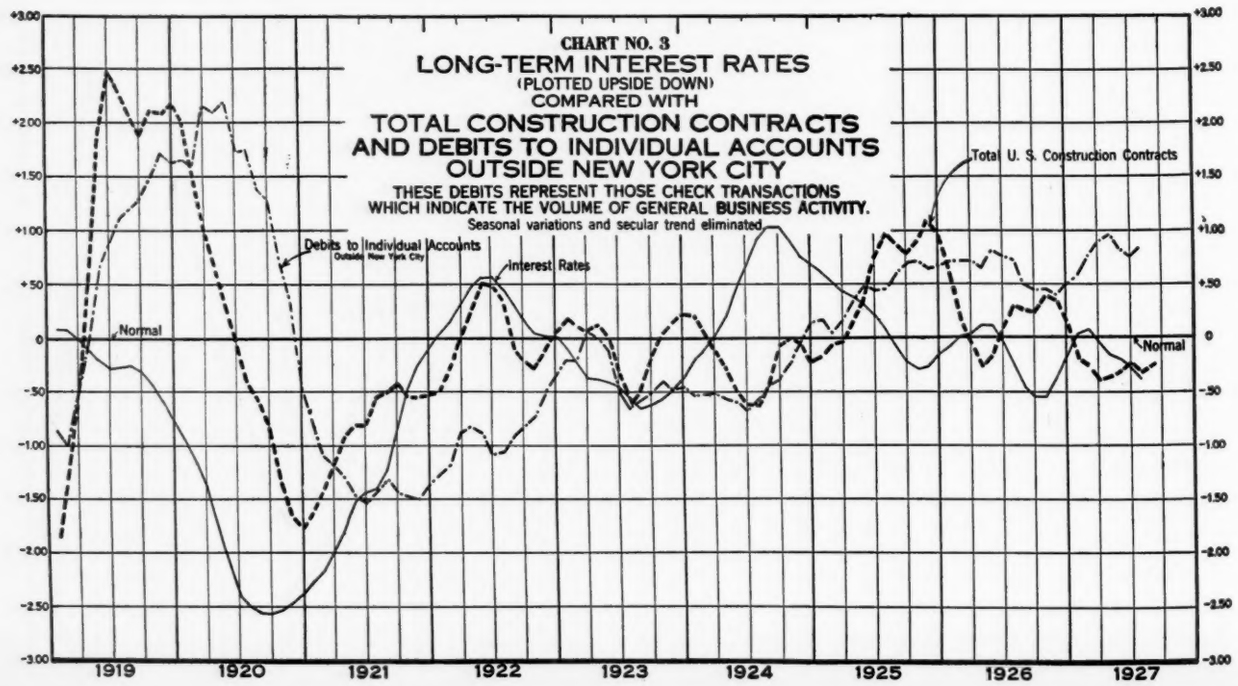
Chart No. 2 compares the curve of municipal bond issues with the curve of contracts for community construction work. Here again, the bond curve gives a very good forecast of the movements of the contract curve, most of the time anticipating the ups and downs of the contract curve by several months. There has been an irregular up-and-down movement of the bond curve from July 1926 to date, followed by a movement in the contract curve that started upward in May 1927 and that does not appear to have been completed yet. Judging from this chart, it looks as if a downward movement in this class of work might take place in 1928. However, such a movement might be irregular and not result in a serious falling off. Even so, total expenditures for construction work of this class are something less than half of total expenditures for private work. In 1927, a drop of 6 per cent in private construction expenditures was almost entirely offset by an increase of 10 per cent in community construction expenditures. So, in 1928, increases in private work are rather likely to more than offset any possible decline in community work.

The third chart carries our story through another step. It consists of three curves. The first one shows the trend of long-term interest rates. This gives an additional picture of investment market conditions. Since high interest rates are unfavorable and low rates are favorable, this curve is plotted upside down. That makes it easier to read this curve's relationships with the other curves. A curve of bond yields might just as well have been used in place of this one. It would look just like it. The second curve shows the trend of total construction contracts, with private work and community work combined. Here, again, it is seen that when investment conditions grow more favorable, a program of increased contract-letting is apt to follow some months later. An up-and-down movement in the interest curve from November 1926 to the present time has only recently begun to fulfill its promise of an upward movement in contracts. Here is confirmation of the forecasts shown by Charts 1 and 2; and added indication of increased construction activity.

The facts stated above are the ones of immediate interest to you as members of the construction industry. But, in the first part of this paper, I intimated that it would be worth our while to trace the flow of money beyond the stage of construction contracts, to the point where it is being used in the purchase of all kinds of articles of general merchandise, all the way from sardines and clothespins to automobiles. The third curve of Chart No. 3 does this. This curve is based on the records of debits to individual accounts outside of New York City. These debits represent check transactions and they give a very excellent picture of the volume of business that is being carried on all over the country. You will see at once that the business, or check-transactions, curve follows the construction contract curve.

We can summarize our story of economics and statistics very simply, as follows: Investment market conditions give a good forecast of the trend of construction contracts; construction activity gives a good forecast of general business activity. Our analysis of investment funds, construction contracts, and general business transactions points to a definite measure of improvement in 1928.

The F. W. Dodge Corporation's rather conservative estimates of total construction expenditures in the United States have been as follows: 1925,



$6,622,000,000; 1926, $6,900,000,000; 1927, $6,800,000,000. It looks as if 1928 ought to be a seven-billion dollar year.

While carefully prepared statistical charts are a great help, it is always well to have some other facts at hand for confirmation of the conclusions drawn from the charts. There are three sets of facts that do confirm the belief that 1928 should be a year of improvement for the construction industry and a fourth factor that suggests a note of caution in making 1928 estimates.

In the first place, agriculture has been depressed and has recently shown considerable improvement. Increased purchasing power in agricultural sections should result in increased building in those territories.

In the second place, the automotive industry has been depressed in 1927 and gives promise of very considerable improvement this year. The automotive industry is one of the most important stimulators of business activity and of business confidence. Anything that promotes confidence in general business also promotes confidence in contract-letting for building and engineering work.

The third factor is important now, but it is likely to be much more important after this year. The electrical industry has been having a very remarkable and continuous growth ever since the war. Electrical energy consumption has had steady and large increases each year, including 1927. Investment money has been flowing into the electrical industry at a remarkable rate. It looks as if this industry had started on a period of very considerable and substantial expansion. Its expansion will not only involve construction of numerous large power-producing units, dams, power houses, transmission lines, and the like; it seems likely to add so much to the general wealth and prosperity of the country, that it may stimulate new demands for finer buildings of every kind, larger community developments, better highways, and more construction of every sort that adds to the comfort and well-being of an increasingly prosperous people.

The fourth factor is politics, and I have no chart to show how much or how little politics may affect business in 1928. With proposals before Congress looking to investigations of power mergers and other phases of current developments in the electrical industry, it looks as if big developments in this line are apt to be deferred for a time. There may be a period of hesitation on the eve of the presidential election, which might cause some important construction projects to be deferred. While politics may not have any sort of adverse influence on business this year, it seems wiser now to consider such things as possible, and to anticipate moderate improvement rather than a big boom.

Murphy Bill Would Hold Railroads Partly Responsible at Crossings

Widespread disapproval on the part of the motorists everywhere at the recent decision of the United States Supreme Court, placing upon the motorist full responsibility in crossing a railroad track, was crystalized in Washington recently when steps were taken to have the law, as laid down by the Supreme Court, changed.

This was done in a bill introduced in the House by Congressman Frank Murphy of Ohio, the purpose of which would be to shift a part of the responsibility to the railroads, which the Supreme Court's decision places upon the motorist. Under the Court's decision, rendered by Justice Holmes, a motorist in crossing a railroad track at a blind crossing, must assume full responsibility and must not only stop, look and listen, but under the rule laid down by the Court, must, if necessary, get out of his car and go onto the track to make certain that a train is not approaching.

The Murphy bill, H. R. 7901, provides that a Federal court, in such a case, must not adopt a rule contrary to the laws of the State, territory, or place where the accident occurred, its effect being to require the railroad to bear such responsibility, at blind crossings, as the state imposes upon them.

Commenting on the measure, Thomas J. Keefe, General Manager of the American Motorists Association, which has already voiced its disapproval of the Supreme Court's decision, declared that the Murphy bill would meet with the approval of the millions of motorists of the country.

"It is both unfair and uneconomical to permit a railroad or a state to maintain a blind grade crossing and make the motorist assume full responsibility for crossing the dangerous spot. The effect of the Supreme Court's decision in the Goodman (Ohio) case, placed such a burden upon the motorist that there was bound to be a reaction against such a law, and Representative Murphy's bill is the first legislative expression that Congress concurs with the motorists' viewpoint that the law is unfair in this respect."

Automobile Fatalities Increase

Automobile fatalities for the 52 weeks ending December 3, totaled 6,969, according to figures just announced by the U. S. Census Bureau. This is an increase of three per cent over the 52-week period last year when 6,658 persons were killed by automobiles. Figures compiled by the American Motorists Association, show that this year there were 21.1 persons killed per 100,000, against 20.07 per 100,000 killed last year. The figures cover only the 77 largest cities of the United States.

A New Vicat Needle Testing Apparatus

A new apparatus with adjustable falling device is made of a brass cylinder. This contains a hollow piston, quite long in relation to its diameter by means of which the perpendicular position of the piston rod is determined during operation. In use, the circular disc E (see Abb. 1) of the apparatus rests upon the free end of the piston and forces the oil to flow into the cylinder through the tube C and the needle valve D toward the upper end of the piston. The speed with which the needle or the piston penetrates the cement crystals and the flow of oil is regulated by valve D. At the German Imperial Institute, the speed of fall is so arranged, that the indicator of the Vicat testing apparatus moves from the upper to the lower end of the scale of 40 mm. in 5 seconds, when the rod carrying the needle moves freely without touching the cement. There is a valve G (see Abb. 3) at the lower end of the piston and three holes of ⅛ inch bore (see Abb. 4). The oil runs back freely through these holes if the piston is moved to the upper end of the cylinder before starting the test. M. W. Neufeld (Zement, November 10, 1927).

Recent Developments in Powder Manufacture

Latest development in powders for quarry work, as reported by the Hercules Powder Company, is the perfection of Hercules Extras of 70 per cent strength and numbered from 2 to 7, or six different cartridge counts, which is said to be the important difference in each grade. This ranges from approximately 240 cartridges of 1¼ by 8 inches per 100 pounds of the number 2 extra to 350 cartridges 1¼ by 8 inches in the number 7 extra.

Being high count per 100 pounds and ranging from high count to very high count, these powders should represent a series of low cartridge cost explosives. Since a cartridge may frequently replace a cartridge of some powders of relatively higher cost, there is an appreciable saving on each cartridge used. From this series, one may choose a powder of suitable cartridge strength and find a real explosive value in an economical powder.

Hercules Extras are credited with being less sensitive to flame, shock friction and impact than some explosives and are listed among those which are relatively safe to use. They are of the highest quality and manufactured on the latest improved low freezing formula.

While much blasting work will continue to require other types of explosives on account of certain characteristics, yet where these powders are suitable, they should do the work economically. This new and improved series should replace all of the special powders, a considerable amount of the extra dynamite and some gelatin.

Automatic Grate for Vertical Kilns

An automatic discharging grate for vertical kilns is shown in figure 9. The circular grate is carried on a vertical shaft coincident with the axis of the kiln, which turns slowly, about 1 r.p.m. The disintegration of the cement blocks is assured by the projecting bars placed above the grate and by the pieces forming a sort of coffee mill effect on the grate itself. E. Rengade (Le Ciment, November, 1927).

Senator Moses Introduces Highway Bill

The construction of an elaborate system of superhighways, greatly enlarging the Federal aid highway program, which provides for 182,000 miles of Federal-aid road, has been asked in a bill just introduced in Congress by Senator George H. Moses of New Hampshire. The measure provides for a highway as direct as practicable between the Atlantic and Pacific Coasts and for cross highways, which would connect the entire United States.

Covers Industry Very Completely

L. R. Witty, General Manager, Wabash Sand and Gravel Company, Terre Haute, Indiana, writes: "Pit and Quarry as now published to my mind is quite an improvement and as far as I can see covers the industry very completely."

New Horizontal Single Cylinder Engine

The "Weber" is a single cylinder, horizontal engine of such extreme simplicity that any man with ordinary intelligence can give it the small amount of attention it requires in connection with other duties. Though "Weber" Engines are of the strictly heavy duty type of construction their design permits of comparatively light weight, making them of particular interest to power users whose business requires an installation of a semi-permanent character.

Almost any grade of commercial fuel oil, crude oil, distillate, etc., may be used in the "Weber" and its fuel consumption being very low, it forms one of the most economical power units on the market. Approximately thirteen h.p. hrs. are obtained from a gallon of fuel oil so that a 100 h.p. engine will only consume in the neighborhood of 75 gallons of fuel in a ten-hour day when operated at approximately full load—other sizes in proportion.

Looks Forward To Its Coming

Bert Koenig, of the Koch Sand and Gravel Company, Evansville, Indiana, comments on Pit and Quarry as follows. "We think the paper a very good one and always look forward to its coming."

DESIGN AND CONSTRUCTION OF MARINE SAND AND GRAVEL UNITS

By R. N. Coolidge

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THERE are so many conflicting opinions among operators as to the merits of certain classes of equipment that a general discussion is sure to receive contradiction as to relative advantage of one piece of plant over another. For instance there are many prosperous companies who have made excellent profits from their business in spite of the fact that another type of equipment may be much more suitable to their work and capable of producing much larger profit. If a dredge will run and produce the proper material many men are averse to changing their methods. Profits speak a strong language and if the operations are profitable they naturally feel very sure that their equipment is most suitable for the work. Exact costs are difficult to assemble and very few companies have made or are willing to make a detailed study of the cost of operation and maintenance of any one piece of plant. Over-all operating costs, fuel cost and labor cost are fairly well known but to make a real engineering study of all costs chargeable to any one piece of equipment to justify its existence or see its obsolescence is rather a rare occurrence.

I am going to borrow a few figures from a report dated Nov. 8th, 1927, published by the Bureau of Mines. The production of Sand and Gravel in this country in 1926 amounted to 183,100,818 tons and was valued at $111,338,701. The average value of the product was 61c per ton. Figures are not available for 1927 but they were probably slightly in excess of the 1926 figures.

Some idea of the enormous yearly output of the sand and gravel producers of the nation may be obtained by the realization that the 1926 production which totaled more than 130,000,000 cubic yards represents the volume of a ditch one yard wide and one yard deep extending three times around the earth. An equal amount of excavation would dig a hole 10 feet in diameter through the earth. The ratio of marine production to bank production is not known.

While considerable quantities of sand were used in glass making, in foundry work, for grinding and polishing purposes, for water filtration, and for helping locomotives get under way, the great bulk of the production was used for building and paving purposes, furnishing another evidence of the great construction boom now in progress. More than two-thirds of the gravel production was used for building and paving purposes.

New York, with a production of 19,334,360 short tons, valued at $11,585,652, led all the states in sand and gravel production. Illinois, with an output of 17,777,169 short tons, valued at $8,714,350, ranked second, while Michigan, with an output of 14,398,338 short tons, valued at $7,265,161, was third.

Thirty-one million tons were used in miscellaneous building work. Thirty-eight million tons were used in paving and twenty-two million tons were used in railroad ballast and fills.

In order to conserve time I am not going to make any extensive reference to the history of marine sand and gravel production. The lessons learned in the past have had their beneficial effects upon the design of present day equipment and from past experience most producers have found that good design and sound engineering are of prime importance. They are interested in overall production costs including interest and depreciation. Naturally the equipment which in the final result allows them to deliver sand and gravel at the lowest production cost and consequent largest profit is the only logical equipment to use.

I do not even suggest that engineering is the most important feature of the sand and gravel business. Management, Sales and Production absorb the major portion of the time, but competition in prices is each year growing stronger and I know of no better method of obtaining the solution to the price problem than by the employment of sound engineering advice and the installation of well designed, efficient equipment.

I have divided the discussion regarding Marine Equipment into three parts, namely: Dredging, Water Transportation, and Unloading Facilities.

Under each of these divisions I will make only brief mention of the older types of equipment and show where possible a few pictures of old equipment as well as new types.

Dredging

Probably the earliest sand and gravel dredges depended upon human beings for power, and strange as it may seem we find some cities of Europe still depending upon this source for their supply.

On a very recent visit to Florence, Italy, I was much interested in watching these human dredges

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in operation. They consist essentially of large size row boats from which men with long handled shovels bring the sand and gravel from the bottom of the river and throw it on an inclined screen.

There are at present three general types of sand and gravel dredges in the United States and each type has its merits for certain localities and requirements. First: The Suction and Ejector Dredges which move the material with water velocity. Second: Dipper Dredges and Clam Shell Dredges which depend upon manual control for each load of material dug. Third: Ladder Dredges.

Due to comparatively low initial cost the Suction Dredge has found a wide field of use and many successful sand and gravel concerns still prefer to use this type of equipment. There are suction dredges of good design with modern machinery which are doing excellent work. If the dredge operates on a stream which is not navigable and the material can be transported to shore through pipe lines on pontoons the suction dredge has much to recommend it. However, the suction dredge, with equipment which will enable the operator to average 12 percent of solids, is very exceptional, and even at this high percentage we find that the best dredging pumps will not enable the owner to elevate his material at a very efficient basis. Somewhere around 10 percent, and the average is probably nearer 8 percent. Of course the pumps themselves have a very much higher efficiency and in some cases this efficiency reaches 60 percent, but we must not lose sight of the fact that the sand and gravel production is the ultimate purpose of the pump and as a medium through which the material is elevated the pump is only about 10 percent efficient. Water raised with it is of very little use in cleaning the material and therefore is partially wasted. Horsepower required to drive the cutter head must also be charged to the tonnage and the net result shows that the dredging equipment requiring a cutter head is not over 8 percent efficient at best.

Maintenance cost of pumps, lines and cutter heads runs high and if the operator tries to load his lines as much as possible he always runs the risk of plugging and thereby loses considerable time in cleaning out. In some river bottoms it is found that the material will not flow to the suction mouth of the pump and in these cases many types of cutter heads are being used to dislodge the material and allow it to flow.

Suction Dredges use various types of prime movers to drive the pumps, such as steam direct driven pumps, steam electric generator motor driven pumps, Diesel direct driven pumps and Diesel electric driven pumps.

The type of prime mover depends largely on local conditions and the comparative cost of coal and fuel oil, or if the dredge is operated in a stream which is not navigable electric power is sometimes brought by cable from the shore.

The problem of screening is very similar on all types of dredges and I will therefore describe this phase of the work later in my discussion. All dredges need prime moving engines and the power phase of dredging will also be discussed later.

The next class of dredges including Dipper Dredges and Clam Shell Dredges has not obtained a very wide popularity among operators except for temporary use. The "lost motion" which is an inherent disadvantage of these dredges has kept most operators from considering their use. However they have special advantages in certain localities and when analyzed will be found to operate on an equal basis with suction dredges in shallow digging but in deeper waters will never be a serious competitor with the Suction Dredge.

The third class of dredges, namely the Ladder Dredge represents the most efficient method yet discovered for digging and elevating material from the bottom of a river. However the design of a good ladder dredge presents more real engineering problems than either of the other two classes and should never be undertaken without expert engineering guidance. Many ladder dredges have been built which are only moderately successful, due principally to poor design and cheap equipment, but again it is probably safe to say that the most successful sand and gravel dredges which have been built up to the present time are of the ladder type. The first cost of these dredges is higher than other types but the assurance of continuity of operation, lower maintenance cost and high over-all efficiency of the unit has yielded to the owners an excellent return on the added investment. There are numerous varieties of ladder dredges but all are similar in principle, simply varying in their features of design. It is a pretty well established fact that the steel hull makes the most satisfactory mounting for ladder dredging equipment. The machinery mounted on one of these dredges represents 70 to 80 percent of the total cost and you can therefore see that it would be very poor economy to mount expensive machinery on a wooden hull. The problem of maintaining alignment and the proper operation of machinery is very difficult on wooden construction requiring constant attention and expense.

In some districts the dredge is moved at short intervals of time while in other districts hundreds of tons of material can be dug without moving the boat. A ladder dredge in the Louisville District recently dug 3,000 tons of sand and gravel, filling six barges in six hours without any interruption. A very nice performance! The sand and gravel beds were deep and of such a nature that they flowed freely into the ladder cut.

The screening problem is similar on all dredges and in most cases this is done in the rotating barrel screen of one, two or three jackets, as the product may demand. These screens are so well known that I believe a description of them will be unnecessary. If the screens are correctly and substantially

built and properly driven there are two factors which should be watched, proper slope and speed of rotation. The proper slope depends upon the material but an average slope of 1½ inches to the foot would cover the majority of installations. Some good screens have slopes as low as 1 inch to the foot and others are as high as 2 inches to the foot but 1½ inches to the foot seems to be the average figure. The proper speed of rotation lies somewhere between 180 and 250 feet lineal speed for the screen surface. The water jets in a rotating screen should be directed at the thin edge of the load so as to facilitate pushing it through the screen and perform the washing operation more effectively. If the jets are directed at the center of the main bed of material the force of the water is dissipated without doing much good.

The material used in screen plates is a very important item; either high carbon steel or manganese plates are generally used and when all things are taken into consideration the honors are about evenly divided.

Much interest has been manifested during the last few years in vibrating screens and a number of successful vibrating screen installations have been made, some more successful than others, but the quality of vibrating screen equipment is being constantly improved and better results are being obtained. Vibrating screens may be divided into two classes: electric type and mechanically operated type. The first of these makes use of the alternating current and solonoid principle to create oscillations with a magnet and stem attached to the screen frame or cloth. The mechanical types depend upon eccentric action or unbalanced weight action, or mechanical tapets to vibrate the frame or cloth.

The lining of chutes on a dredge is a troublesome item and one on which considerable study has been made. One of the rubber companies has perfected a high grade rubber lining for sand and gravel chutes which has gone a long way toward eliminating much of the trouble with chute linings. Sheet rubber is vulcanized to thin plates of steel which can be bolted in the chutes. The greatest mistake which can be made with rubber linings is to make the rubber too thin and in these cases the linings will not last very long. Gravel chutes require much thicker linings than sand chutes. If gravel has a fall of five or six feet the rubber should be at least 1¼ inch thick, and the section of gravel chute in which the gravel slides or rolls should have rubber from ½ to ⅝ inch in thickness. Very fine gravel or shot need linings about ½ inch thick, and sand chutes should have rubber ⅜ inch thick. The installation of rubber should be done with great care so as to leave no exposed edges or ridges, and bolt heads should be protected. Dredge operators are finding a marked saving in the use of rubber lined chutes.

Sand and gravel are known as excellent abrasives, and when mixed with water are capable of wearing away iron and steel at a remarkable rate. It is probable that the greatest strides to be made in dredge building during the next few years will be made in the science of metallurgy and heat treatment of steels. Tests and experiments have been made which have led to great improvements and the prolongation of life in certain dredge parts, but many needless experiments are made for lack of information of previous tests. High powered salesmanship of some special steels is responsible for many expensive experiments which were doomed to failure before trial due to the unsuitability of the metals.

No discussion of dredges could be complete without some mention of the various types of prime movers. If electric power is available by cable from shore the operator is indeed fortunate, and if electrical current is fairly reasonable he has probably the best kind of power that it is possible to get. These possibilities are only for the favored few and the large majority of dredges must generate their own power. If a steam plant is used the question arises as to whether oil or coal is to be used for fuel and the question should be easy to answer. A pound of fuel oil contains about 18,000 heat units. A pound of coal cor.tains about 13,000 heat units. Good boiler efficiency with oil fuel will average about 80 percent and with coal will average about 70 percent. If the price of 1 bbl. of fuel oil is less than ¼ of the cost of 1 ton of coal, oil would be the logical fuel, otherwise coal should be used.

Putting the fuel cost comparison another way we can say that if fuel oil costs 6c a gallon and coal $10.40 a ton, the fuel cost would be about even. Of course investment, depreciation, standby losses, and labor costs must be taken into consideration in the final decision. In some installations oil fired boilers are used because oil is easier to fire and needs less labor to operate than coal burning boilers but there are few places in the United States where oil fired boilers are as economical in total firing cost as coal burning boilers.

If good boiler equipment has been chosen it is equally important to select economical steam engines or turbines. The ordinary slide valve noncondensing engines use from 25 to 75 lbs. of steam per horsepower hour, and these engines although cheap in first cost are ultimately very expensive equipment to the dredge owner. There are excellent dredge engines on the market delivering reliable power for less than 15 lbs. of steam per horsepower hour, or 1/3 of that required by the old type "D" valve engines.

If Diesel Engines are considered the story may be different. The best Diesel engines deliver power at about 30 percent overall efficiency and when combined with electric drive will have an overall

efficiency of 24 percent. A Diesel Electric drive will will require about 6/10 lbs. of fuel oil per horsepower hour. If oil costs 6c a gal. the fuel cost would be about 5 mills per horsepower hour.

If coal costing $5.00 per ton is used in a good steam plant the fuel cost will also be about 5 mills per horsepower hour. Variations in these prices for fuel will throw the preference to Diesel power or Steam power according to which fuel sells at the best advantage when compared with the above ratio of fuel costs.

In the Pittsburgh District oil costs 7c per gallon and coal costs $3.50 per ton. Therefore coal as fuel will cost only 56 percent of the cost of Diesel fuel oil. These figures are offered to give only an approximate idea of relative fuel costs. Each layout of machinery is a special problem and must be analyzed as such. The entire fuel cost for a year's operation is less than 1c per ton of finished sand and gravel on some of the best steam dredges of the ladder type.

The other types of drives used on dredges include turbine electric generator motor driven and Diesel electric generator motor driven dredges and many suction dredges are Diesel direct driven.

Electric power possesses good flexibility characteristics but 17 to 20 percent loss of efficiency result from its use and furthermore it is very expensive when properly installed and requires higher priced labor to operate satisfactorily.

Electric generators can however be driven by high efficiency turbines and the net fuel cost of delivered power may be made as low as direct driven power. Standby losses on the turbine electric dredge are somewhat higher because the main turbine is rarely shut down while moving the dredge to fresh digging.

Barges

Most dredge operators find it much more practical and profitable to finish their material to the proper sizes before it is delivered from the dredge and therefore only the resultant salable product is loaded in the barges ready for transportation to the distributing points. Therefore the next logical step in the discussion of Marine sand and gravel units would be to include here a few remarks regarding barges.

Many conflicting opinions exist regarding the proper design of barges for the sand and gravel industry and undoubtedly each argument has some virtue when all facts of the case, such as locality, type of river, locks and dams and weather conditions are taken into consideration. Of course when the industry was started practically all of the barges were of wooden construction. Timber was cheap in those days and of a far better quality than it is today. Furthermore we did not have the sources of supply for steel barges which now exist. All barges come under one of three general classifications.

First, the hopper barge in which the load is carried on the floor supported by the bottom beams with the load below the water line.

Second, the half deck type in which the load floor is made at some point between the bottom beams and the upper deck allowing the load to rest partially below the water line. This type of barge is seldom built.

Third, the flush deck barge which as the name indicates carries its load on the top of the barge and keeps it in place by means of a cargo box.

The hopper type in wood is somewhat cheaper in first cost than the other designs but having no upper deck it is structurally weaker and consequently more liable to buckle in collision or rack when grounded.

If the hopper barge be constructed of steel with adequate provision for strength the barge cost will be more than the cost of a comparable deck barge.

All water coming to the barge with the sand and gravel must be pumped out of the hopper. Usually syphons are used. The two three inch syphons normally used in each hopper barge cost the owner by actual test $3.00 per hour for fuel alone if coal is delivered to the dredge at $3.50 per ton and they will cost correspondingly more at higher prices for coal. The syphoning problem is one of the main points of disadvantage in the hopper barge.

The water coming over with the sand and gravel to a flush deck barge is drained off through the cargo box limber holes allowing the producer to sell drier material and eliminate the cost of towing excess water.

The main argument which has been advanced for the hopper type of barge is its stability in comparison with the deck barge. It is true that deck barges have been known to upset but I know of no case where a deck barge has been accidentally upset unless it has been in a collision or a great amount of water has been found in the hull. This may be charged to carelessness.

Now as to the matter of comparing wooden barges with steel barges. It is unusual to find a wooden barge with a useful life of ten years. This does not mean that wooden barges have not been in use for longer periods of time than ten years but it does mean that the maintenance cost on an old wooden barge after it passes its seventh or eighth year of operation will run so high that it is an economic waste to keep it in operation. On the other hand steel barges are now in operation and in good shape which have been in daily use for over fifteen years. It is a fact that a well designed steel barge will deliver from twenty to twenty-five years of useful service to its owner without excessive maintenance cost. It is unfortunate that barge building has not received more intelligent engineering direction. I suppose it was but natural when the transition was first made from wooden to steel barges to carry over the same shape and type of

hulls into steel barges which had been in use for many years in wooden barges.

The operator, who is much concerned about his towing costs, should certainly look into the merits of the barge proposed to him by the boat builder. The shape of the rake ends alone can make a very great difference in the owner's towing charges for a year's operation. If the sand and gravel deposit lies downstream from the point of distribution, it is of course necessary that the barges be towed upstream with the load.

You can readily see that if a certain barge with curved rake ends has a resistance 30 percent less than a barge with flat rake ends that it would be an economic waste of power, fuel bill and man power to operate such a barge. It is advisable to look very carefully into the internal construction of the barge; whether or not the lateral or longitudinal bracing is well designed; whether the floor beams and deck beams are of sufficient size to withstand the bottom loads and deck loads which are imposed upon them. In other words a design of a barge is an engineering problem which should be referred to engineers with ability, training and experience along these lines. Cast iron deck fittings should not be used. They break easily and the additional cost for cast steel deck fittings is a wise expenditure.

The most desirable capacity per barge for any project is determined by the size of the dredge which furnishes the load, the size of towboat which must make the barge delivery to the distributing point and lastly the capacity of the unloading station will also have effect upon the proper size of barge to suit the needs.

At the present time the size varies from 350 tons to 750 tons, the tendency being toward the larger sizes. With the increase in the size of loads and the desire by owners to find a barge which would stand rough handling, require a minimum of repairs and pumping and at the same time eliminate the constant worry of sinking wooden barges the steel barge has been developed. Steel barges are no longer an experiment, they are almost a necessity and have long since justified themselves in the economical conduct of sand and gravel production.

Large barges cost less per ton of capacity and cost less to tow per ton mile. However in most localities the business seldom requires a long tow and often must be loaded and unloaded where the depth of water and maneuvering space is restricted so that extra large barges cannot be used.

Most plants use a clam shell bucket to unload the barges. These buckets impose a severe service on the deck of barges. The use of deck plating of same thickness as sides and bottoms with same spacing of supports has been found unsatisfactory. To remedy this, heavier deck plating and closer supports are used. The use of concrete 2½ to 3 inches thick sometimes reinforced with rails; also use of 3 inch gumwood planking overlaying the steel deck has been used. The least maintenance is probably in connection with the heavy steel construction. Practically all steel barges are built with end collision bulkheads at each rake end and the center portion of the barge makes one large watertight compartment. The skin plating is usually 5/16 inch and frame spacings are approximately 24 to 27 inches in the wall constructed barges.

The perfection of copper bearing steel has had a beneficial effect upon the life of steel floating equipment. The percentage of copper varies between ¼ and ½ percent. Many exhaustive tests have been made to determine the proper amount of copper to be used. No definite information is available to show the exact prolongation of life which may be expected from the use of copper bearing steel but it is safe to say that its additional cost of $4.00 to $6.00 per ton of steel is justified by adding materially to the life of the plating. Copper bearing rivets should always be used with copper bearing plates.

Copper steel and ordinary open hearth steel plates should always have a good protective paint covering to protect the surface against corrosion. The problem of finding the best paint for the outer surface of barges has also received much attention. It has not been solved but nevertheless very satisfactory results have been obtained. All paints require a clean surface of steel, dry, free from frost, mill scale and rust. In the Pittsburgh district a priming coat of good quality red lead without driers, followed by a second coat of Colomastic paint well applied is giving good results. The inside of a barge must also receive careful attention to prevent rust. A priming coat of red lead followed by a coat of Marine Anti Corrosive will remain in excellent condition for 8 to 10 years or more. There are other good outside paints such as iron oxides, patent marine paints, most of which show better results when red lead is used for priming coat.

After the material is loaded into the barges of course it must be towed to its destination. Perhaps there is no piece of river equipment on which there are so many conflicting opinions as exist in design of a towboat.

Towboats

Towboats may be classified under two general types; namely, stern wheel and propeller types, and of course each of these main classes must again be subdivided according to the type of engines or prime movers used. The same discussion regarding steel and wooden hull construction applies with even greater force to towboat building. The definite trend is undoubtedly toward all steel construction. The relative merits of the stern wheel and propeller type of boat has long been a hotly contested point and I do not propose at this time to

enter into any involved discussion regarding the superiority of either type. However a few brief statements regarding each type should be given.

The maneuvering capabilities of the stern wheel boats are generally thought superior to those of the propeller type, but even this point has been challenged and proven to be in error in a few cases. Perfected designs of rudders for propeller boats may very easily overcome this objection.

The propulsive efficiency or push per horsepower in the propeller type of boat is greater than the stern wheel at speeds beyond 5½ M. P. H. The propeller boat is cheaper in first cost to build and the maintenance cost should be less.

In this discussion I am of course thinking of both classes of boats in shallow draft service. The stern wheel boat was developed for shallow draft work and the propeller boat must be considered on the same basis. In deep water conditions the propeller boat possesses such marked superiority that there is little ground for comparison. In shallow draft the propeller rarely extends below the keel of the boat as otherwise serious damage might be done when the boat was grounded. Then in order to get propeller blade area of sufficient size to absorb the engine horsepower efficiency a tunnel construction in the hull results in part of the propeller being out of water when the boat is not running. The stream line is changed when the propellers are started and the propellers are completely immersed.

At times the western rivers carry a large amount of drift and consequently a means must be devised to keep this material out of the propellers. This is usually done by a model bow on the boat so built that the water is split and drift passes to either side of the boat.

The proper selection of propellers and the best design for the stern end of the boat is a highly technical problem, on one about which many pages of theoretical and experimental matter have been printed. Consequently it would be practically impossible to enter into such a discussion in this paper.

If the chief function of a towboat lies in short tows and much maneuvering the stern wheel has some advantage but if the hauls extend over a long distance with only an average amount of handling to do the advantage probably lies in favor of the propeller type of boat. This question will always be debatable until we have more research and testing done for comparative data.

With the advent of Diesel engines an entirely new type of stern wheel boat has been developed; namely, a split stern wheel boat in which are mounted two Diesel Oil engines, each driving a separate stern wheel entirely independent of the other. The handling capabilities of this type of boat are remarkable and the simplicity and reliability of some of the driving mechanisms are leading many operators to consider the adoption of this type of equipment.

The steam boat has for many years labored under a handicap imposed upon it by construction carried over from early day practice. In those days most boilers were fired with wood picked up along the river banks and boilers were built for wood fuel and steam for high pressure non-condensing engines. It is surprising to note the inertia and reluctance which many old steam boat men display in giving up these old time obsolete boilers. The combustion at best is incomplete and the overall efficiency of the boilers is out of line with present day standards. Most of these boilers operate on an efficiency less than 60 percent.

The old type of engines are also being used far more extensively than their performance would seem to justify. Most of the rivers contain more or less sewage, and foreign matter. Some contain large amounts of acid, others have a heavy content of salts. This matter is very injurious to boilers and consequently boiler troubles are increasing and owners are each year looking for effective means of reducing boiler repairs. Evaporators are used and condensing apparatus is being installed. Of course the chief function of the condenser is the saving of fuel but the saving of pure water is almost equally important. Condensers, evaporators, efficient steam engines and boilers, preheaters, and superheaters are being installed on some of the recent boats but not without considerable opposition. If the steam boat man would apply the engineering discoveries and lessons of the past twenty-five years there is little doubt that a power plant could be installed which would compare favorably with Diesel engines for operating cost. However, it has been said that "The steamboat man is his own worst enemy" in preventing the use of modern equipment on his boats.

The high fuel cost and labor cost of operating a steamboat have been the chief factors in the strides which the Diesel propelled boat construction has been making during the last five years.

Diesel boats are made with direct driven power transmission and electric transmission. The two types of transmissions have many champions arguing the superiority of their particular choice. I do not intend to enter any argument at this time but a few general statements may be made.

The direct driven transmission can be made and is being made about 95 percent efficient in the better designs. The electric transmission cannot be made, in the present state of the electrical equipment, to exceed 80 percent efficiency.

The Diesel electric transmission is more costly and much heavier than the direct drive. It does however permit the use of high speed somewhat lighter engines but the weight of engine and electric equipment is always heavier and more expensive than the direct drive.

The main argument advanced for the electric drive is its flexibility and ease of control. We must admit that electric drive permits the use of full engine horsepower under all conditions of load, whether the boat is loaded heavy or light, but it is questionable whether this advantage is not more theoretical than actual when we consider the lower efficiency of the electric drive and the length of time a boat is operated with loads at which the electric flexibility would be of some advantage.

Unloading Plants

When the towboats deliver the barges to their destinations unloading and distributing stations must handle the material. This particular phase of the operation is often very wasteful in material and expensive to operate. There are, however, some very efficient, well designed unloading plants.

The cheapest plant in first cost usually consists of a stiff leg derrick operated by a steam hoist, which by means of a clam shell bucket unloads the material from the barges to a pile and rehandles from the pile to a truck or railroad car. For very small stations they may serve the purpose but stations handling any considerable amount of tonnage soon find the operation expensive. The better types of stations use well constructed gantry type cranes or bridge cranes of either the fixed or movable type.

In the large majority of cases the distributing stations of any considerable size are located where electric power is available for power and it provides the most satisfactory as well as the cheapest source of power.

If the unloader be of crane type, the hoisting engine should be heavy duty type with cast steel gears and cut teeth of adequate size for the load. Friction brakes and clutches are the chief source of trouble in the cheaper types of hoists. The areas should be ample to carry the load without generating excessive heat which is so destructive to linings or blocks. Sheave sizes should be large enough to eliminate damage to wire rope caused by short bending.

1927 Was the Second Highest Year in the Construction Industry

The 1927 construction volume was the second highest in the history of the country, according to F. W. Dodge Corporation. Contracts let on new building and engineering work in the 37 states east of the Rocky Mountains during the past year reached a total of $6,303,055,100, which was a drop of only 1 per cent from the record total of 1926 and an increase of 5 per cent over the total for the year 1925. For the entire country the total 1927 construction volume was estimated at a little over $6,800,000,000, being a loss of 3 per cent from 1926.

There was $477,363,800 worth of new construction started in December in these 37 states, which was a gain of 3 per cent over the total for the preceding month and a drop of 11 per cent from the total for December, 1926. Included in the December record were: $207,280,600, or 43 per cent of all construction, for residential buildings; $92,657,300, or 19 per cent, for public works and utilities; $86,933,100, or 18 per cent, for commercial buildings; $29,988,800, or 6 per cent, for industrial projects; and $23,247,600, or 5 per cent, for educational projects. Contemplated construction projects were reported in this territory to the amount of $988,915,100 in December. This figure shows gains of 20 per cent over the amount reported in November, 1927, and 9 per cent over the amount reported in December, 1926.

New York State and Northern New Jersey

December construction contracts amounted to $128,890,000 in New York State and Northern New Jersey. Last month's total was almost the same as the amount ($129,313,800) reported in November, 1927, but was 43 per cent under the record for December, 1926. Analysis of the December building and engineering record showed the following important classes of work: $75,133,200, or 58 per cent of all construction, for residential buildings; $19,755,800, or 15 per cent, for commercial buildings; $17,408,200, or 13 per cent, for public works and utilities; and $4,240,000, or 3 per cent, for educational projects.

During the year 1927 there was $1,684,445,300 worth of contracts let on new building and engineering work in this district, being a loss of 5 per cent from the total ($1,775,060,200) for the year 1926. New work contemplated in New York State and Northern New Jersey in December reached a total of $236,081,300, which was a gain of 68 per cent over the total for November of this year, but a loss of 7 per cent from December, 1926.

New England States

The New England States had $30,862,600 in contracts for new construction work during December. The above figure showed a loss of 27 per cent from the total for November, 1927, and was 7 per cent less than the total for December, 1926. Included in last month's construction record for this district were the following items of note: $14,955,600, or 49 per cent of all construction, for residential buildings; $6,748,300, or 22 per cent, for public works and utilities; $2,575,800, or 8 per cent, for commercial buildings; and $1,852,400, or 6 per cent, for hospitals and institutions.

The year 1927 closed with a total construction volume of $412,767,300, being a loss of 6 per cent from the amount ($441,183,100) for the previous year. Contemplated construction planned in the New England States in December amounted to $50,597,000, which was a gain of 25 per cent over the amount reported in December, 1926, but was a loss of 12 per cent from the amount reported in November, 1927.

Middle Atlantic States

Building and engineering contracts were awarded last month to the amount of $45,572,800 in the Middle Atlantic States (Eastern Pennsylvania, Southern New Jersey, Maryland, Delaware, District of Columbia and Virginia). The above figure showed a drop of 5 per cent from the total for November of this year and was 2 per cent under the total for December, 1926. Analysis of the December construction record for this section showed the following items of importance: $23,575,500, or 52 per cent of all construction, for residential buildings; $7,402,300, or 16 per cent, for commercial buildings; $6,430,600, or 14 per cent, for public works and utilities; and $2,526,000, or 6 per cent, for educational projects.

New construction started in these states during the year 1927 reached a total of $721,148,300, which was a gain of 5 per cent over the amount started in the year 1926. Contemplated new work reported in the Middle Atlantic States in December amounted to $138,385,400. This figure showed an increase of 51 per cent over the amount reported in December, 1926, but was 3 per cent under the total for November of this year.

Pittsburgh District

December construction contracts let in the Pittsburgh District (Western Pennsylvania, West Virginia, Ohio and Kentucky) amounted to $42,458,800. This figure was almost the same as the amount ($42,618,300) reported in November, 1927, but was 5 per cent less than the total for December, 1926. Last month's building and engineering record included the following important classes of work: $13,745,900, or 32 per cent of all construction, for residential buildings; $13,474,900, or 32 per cent, for public works and utilities; $6,163,800, or 15 per cent, for educational projects; and $3,185,100, or 8 per cent, for commercial buildings.

Total building and engineering work started in these states during the past year amounted to $758,134,500, as compared with $741,368,100 for the year 1926, being an increase of 2 per cent. New work contemplated in the Pittsburgh District in December reached a total of $65,739,200. Last month's total showed a loss of 52 per cent from the amount reported in the preceding month and was 7 per cent less than the total for December, 1926.

Highest December in the Central West

New construction started in December in the Central West (Illinois, Indiana, Iowa, Wisconsin, Southern Michigan, Missouri, Kansas, Oklahoma and Nebraska) amounting to $164,258,000 was the highest December contract total yet on record for this territory. It was 35 per cent ahead of the total for November, 1927, as well as 29 per cent over the total for December, 1926. The award of a single contract amounting to $25,000,000 in the commercial class helped to swell the month's record.

Analysis of the December building record in the Central West showed the following items of note: $65,078,100, or 40 per cent of all construction, for residential buildings; $47,998,600, or 29 per cent, for commercial buildings; $25,993,700, or 16 per cent, for public works and utilities; and $8,705,000, or 5 per cent, for social and recreational projects. During the year 1927 there was $1,812,848,700 worth of contracts let on new building and engineering work in the Central West, which was an increase of 9 per cent over the total ($1,669,042,800) for the year 1926.

The Northwest

The Northwest (Minnesota, the Dakotas and Northern Michigan) had $3,032,600 in contracts for new construction work during December. The above figure showed losses of 39 per cent from the preceding month and 12 per cent from December, 1926. Included in the December building record were: $1,412,700, or 47 per cent of all construction, for public works and utilities; $1,131,000, or 37 per cent, for residential buildings; and $282,400, or 9 per cent, for commercial buildings.

The year 1927 closed with a total construction volume of $83,816,700, which was a loss of 18 per cent from the total for the previous year. Contemplated new work as reported in December in the Northwest reached a total of $8,053,800, which was a drop of 23 per cent from the amount reported in November, 1927, and December, 1926.

Southeastern States

December construction contracts in the Southeastern States (the Carolinas, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas and Nebraska) amounted to $49,092,600. Last month's record showed an increase of 26 per cent over the total for December, 1926, but was 8 per cent less than the total for November, 1927. Included in the December building record for this territory were: $18,725,400, or 38 per cent of all construction, for public works and utilities; $11,372,200, or 23 per cent, for industrial projects; $8,827,500, or 18 per cent, for residential buildings; and $4,085,500, or 8 per cent, for commercial buildings.

New construction started in the Southeastern States in 1927 reached a total of $610,789,300, being a loss of 16 per cent from the total for the year 926. Contemplated new construction reported in this district during December amounted to $64,162,500. This figure showed a gain of 3 per cent over the amount reported in November, 1927, but was 11 per cent under the total for December, 1926.

Texas

Texas had $13,196,400 in contracts for new building and engineering work during December.

(Continued on page 99)

COMPENSATION INSURANCE FOR MARINE SAND AND GRAVEL PRODUCERS

By J. L. Richmond
Union Sand and Gravel Company, Huntington, W. Va.*

COMPENSATION insurance for marine sand and gravel producers has been a matter of considerable concern for producers on inland waterways during the last few months, particularly since the passage of the Longshoremen's Act. Most producers on inland waterways have depended upon State compensation insurance since such laws were enacted, not considering there was any liability that this class of insurance did not cover. It now comes to light that this affords very little protection, as only employees working on the shore entirely and around tipples and bins are fully covered. Under present court rulings producers have to assume risks under three laws: State compensation for forces working entirely on shore; Longshoremen's and Harbor Workers Compensation Insurance for employees working between shore and water, assisting in unloading barges; and the third liability comes under the Admiralty Act for all employees working on floating property.

The last session of Congress passed a Bill known as "The Longshoremen's and Harbor Workers' Compensation Act." This act is solely for the protection of harbor workers and was passed March 4th, 1927, effective July 1st, 1927. After the adoption of State compensation laws, their application to longshoremen and similar localized harbor workers was general—the New York statute specifically included them. Such application was soon challenged, however, and the jurisdiction of the States over occupation classed as maritime was denied by the courts. Congress then undertook to amend the judicial code so as to confer the necessary authority on the States (Act of October 6, 1927, 40, Statute 3950; Act of June 10, 1922, 42, Statute 634). Both efforts were held to violate the provision of the Constitution as to legislation affecting the uniformity of the maritime law and exclusive power of Congress to act. Thereupon the enactment of a general law was considered, to be applicable to longshoremen and harbor workers who are within the jurisdiction of Federal legislation.

In formulating the longshoremen's act, Congress was willing to include seamen, but they did not care to have their present arrangement changed as they have for a long time been working under an agreement the seamen's union had with the shipping interests. Under this plan, seamen receive full time, board and medical attention during illness and disability.

It is generally understood that individuals operating packets and tow-boats on inland waterways have not been interested in the passage of a compulsory Federal law for compensation insurance covering liability to employees under the Admiralty Act, preferring to assume the risks and make personal settlements.

Sometime prior to July 1, 1927, the matter of the Longshoremen's and Harbor Workers' Compensation Act was brought to our attention and we immediately got in touch with the United States Employees Compensation Commission at Washington to find to what extent the act affected our operations. After considerable effort we secured an opinion from the Chief Counsel of the department, as follows:

"It is recognized that employers having employees on floating equipment on a navigable river as well as employees upon shore, will have some difficulty in covering their liabilities under two compensation laws that may be applicable—and the general Admiralty law. These difficulties may be more acute in cases where the liability on shore is and can be covered only in a State fund and not by an insurance policy."

While it was urged upon Congress that masters and members of crews of vessels should be exempted from the Longshoremen's Act, and Congress before passing the bill made this exemption, it may be that the exemption went further than was really intended, but as the bill became a law it specifically exempted a master or member of the crews of any vessel.

This makes the exemption apply not only on the high seas, but to every navigable stream in the United States and under the interpretation of the word vessel—that is well established it cannot be held that the master or a member of the crew of any floating craft capable of transportation by water is within the Longshoremen's Act. Whether or not masters and members of the crews of any vessel upon inland waterways should be within the benefits of the Longshoremen's Act is not a question for consideration by the Commission, for the reason that Congress has made the law—all inclusive.

Opinion No. 9 approved by the Commission on September 7, 1927, relates to sand and gravel operations on the Ohio River as they were presented to the Commission. In the opinion the statement was made by the Commission that at no time, regardless of what work he may be doing, does the master or any member of the crew of a vessel come under the provision of the act.

*Presented before the National Sand and Gravel Association at Detroit, January 5, 1928.

1. Those employees of the company working only upon the land and upon the docks or piers seem to be subject to the State compensation laws and entitled to its benefits.

2. Those employees of the company who work partly upon water and partly upon the shore in the work of loading or unloading or repairing of vessels are, for a part of the time in maritime employment upon the navigable waters of the United States and subject to the Longshoremen's Act and entitled to its benefits if injured while in this status.

3. A master or member of a crew of a vessel is specifically excluded from the Longshoremen's Act and not subject to it or entitled to benefits under it, no matter in what work he may engage while continuing the relationship of master or member of the crew.

It seems from this statement of the situation in which employees of the company may be placed, that such employees are subject to and entitled to the benefits of the Longshoremen's Act in the situation described in paragraph No. 2. Although it is a matter of decision by the industrial commissions of the States, it would seem that employees in the status referred to in paragraph No. 1 would be entitled to the benefits of the State compensation law. They certainly would not come under the Longshoremen's Act.

Employees while in the situation referred to in paragraph No. 3 cannot be subject to or entitled to the benefits of the Longshoremen's Act, and it is not proper for the Commission to attempt to determine under what law such employees are entitled to relief. If the State compensation law is construed by proper authority to include them or it to be held that they are entitled to their remedy in Admiralty unaffected by the Longshoremen's Act, and certainly the Longshoremen's Act does not affect the rights or remedies of a class specifically excluded from it. It is plain that the U. S. Employees' Compensation Commission, being charged with the administration of the Longshoremen's Act, cannot express an opinion as to how employees so situated are to be compensated or have a remedy for injuries sustained in the cause of their employment.

If marine sand and gravel producers have no employees employed in maritime employment on the navigable waters of the United States, except masters and members of the crews of a vessel, they would have no operations coming within the terms of Longshoremen's Act and therefore they would appear to be in the same position they were in at the time of Longshoremen's Act became effective July 1st, 1927. In such a situation their requirements as to covering their employees under a State compensation law or otherwise is unaffected. If the State Board decides that it cannot cover the crews of vessels, it would seem that the company would be subject to its ordinary liability in Admiralty which it might carry or cover by marine insurance. If the law relating to the State Fund should be amended to authorize it to cover liability fixed by the Longshoremen's Act, it would not effect a company now having no liability under such Act and it would appear that it could not be covered by Compensation law unless the Longshoremen's Act should be amended to include crews of vessels within its terms.

Without multiplying instances, which could hardly show more fully the need of a clarification of the existing situation, reference may be made to a few points of application of the compensation laws in certain other aspects of the question. Thus, in State ex rel. Cleveland Engineering Construction Co. v. Duffy (1925),—Ohio St. —, 148 N. E. 572, the Supreme Court of Ohio had before it an application of an employing firm to procure the acceptance by the industrial commission of premiums from it. It was a large corporation employing men in varied classes of work, some on floating derricks and floating dredges or floating pile drivers, others employed in hauling stone, piles, and fuel, or engaged in diving, blasting and other activities, besides mechanics engaged in repair work, tug men operating steam tugs, and stevedores employed in the handling of materials on the various agencies used by the corporation. The employees in the various classifications were said to "desire to accept compensation under the workmen's compensation law of Ohio, in lieu of and in preference to their rights under the maritime law in all cases of injury or loss of life while engaged in said employments." It is clear that the employment was not commercial in any aspect, the business of the organization being the construction and maintenance of docks, breakwaters, jetties, and the like, filling or deepening channels, installing pipe, digging trenches, dredging foundations, and similar work. However, as much of its work was performed on "floating vessels on navigable waters," at least a part of the employment was maritime, and the commission declined to accept jurisdiction on the ground of the construction given the State compensation laws and the Judicial Code by the Supreme Court of the United States. The supreme court recognized the validity of the application of the doctrines in the Jensen and other cases to certain occupations, but also recognized the impossibility of an advance determination of the amounts of premiums due the State fund for workmen engaged in occupations falling within the terms of the State law as distinguished from the maritime activities. However, it assumed the possibility of distinguishing between strictly maritime occupations and those engaged in by the employer in the present instance, "for the reason it does not appear by the allegations of the petitions that a single one of plaintiff's employees will ever

come in contact with a vessel engaged in commerce, foreign or domestic, intrastate or interstate, or with navigation in its generally accepted meaning."

Following the above decision, which required the industrial commission to answer the contentions of the engineering company, the case was brought up on its merits, the commission conceding its willingness to receive premiums based on the wages of the men engaged in nonmaritime activities, but denying its jurisdiction in the case of maritime employments. The court found it impossible to declare, upon the record in the case, that some of the employment might not be at some time "purely maritime in character and nature," so that they would fall within the jurisdiction of maritime law. Since the commission had expressed its readiness to accept premiums on the basis of a recognized division of labor, the mandamus asked by the engineering company to compel the acceptance of premiums was held to be unnecessary. (149 N. E. 870).

The point was urged in this case that there was nothing in the conduct of the company's business that shows the distinctive features of maritime activities, leading the company or urge vigorously the doctrine of the Rhode case in regard to local conditions which "can not materially affect any rules of the sea whose uniformity is essential"; and the layman's reaction to such a contention would seem naturally to be in its favor. Such a position would derive a measure of support from a decision of the court of appeals of New York (Brassel v. Electric Welding Co. (1924), 239 N. Y. 78, 145 N. E. 745), in which a repair man working on a vessel in a dry dock suffered injuries for which he procured, on his own application, an award of compensation from the State industrial board. Subsequently the injured man sued to recover damages in admiralty, and the trial judge held that the State board was without jurisdiction because the injury was suffered on navigable waters. The court of appeals reversed this finding, not only on the ground that the employee had effected an accord and satisfaction by accepting the award, but also because he had by his own act taken advantage of a law which, by its terms, was to be "exclusive and in place of any other liability whatsoever." It was an estoppel against pursuing any other remedy, at least unless he should disaffirm his right to an award and tender back the amount already received. The court did not go so far as to decide what might have happened if the employee had been acting under a mistake; nor did it decide the question as to "whether the award has the effect of a binding adjudication." However, the practical result of the decision was to effect that there had been an election of a remedy in a case of actual maritime tort, and that recovery thereunder prima facie deprived the beneficiary of pursuing any other remedy.

In the foregoing case the court, without deciding, entertained an assumption to the effect that the award by the industrial board was void and, "at least while unpaid, it might have been set aside or disregarded." However, as appears, accepting the award was held a bar to other proceedings.

The Supreme Court of Oregon went farther in a number of cases before it involving the same principle. In this State, compensation payments are made from the State fund, and the industrial commission had awarded benefits in a variety of cases within or bordering upon the admiralty field. The occupations included shipbuilding work after launching, ferry operation on navigable waters, stevedoring work on board a seagoing vessel, the operation of a motor boat on navigable waters, and freight transportation including the operation of a steamboat. The court found that "in all of these cases the injuries were the result of accident, and no question of maritime tort were involved." It may be remarked in this connection that the conclusion is probably not warranted that there was no negligence, but inasmuch as compensation is due merely in case of accident, no necessity for pleading negligence existed. The subject presumably was simply passed over as not being in issue. Be that as it may, the court found that employer and employee were in each case working and operating under the provisions of the State compensation act. The Jensen and Knickerbocker decisions were analyzed, as well as others in the field, but the court could not discover "any possible contingency under which application of a compensation law (to the cases in hand) might prejudicially interfere with the application of any of the rules of maritime law." Since "it is not the policy of a law, international or otherwise, to pull parties into court by the hair when they have agreed between themselves upon a method of keeping out," a mandate was authorized directing the trustee of the fund to make the payments in accordance with the awards of the industrial commission. (West v. Kozer (1922), 104 Oreg. 94, 206 Pac. 542).

The point in issue was also involved in a case before the Court of Appeals of Kentucky (Lee v. Licking Valley Coal Digger Co. (1925),—Ky.—273 S. W. 542). Here an employer and an employee were, by agreement operating under the State compensation act, and on presentation of a claim of the widow a death benefit for the loss of her husband was allowed under the act. The employer resisted the award, and it was set aside by the courts as being outside the jurisdiction of the compensation board on account of the maritime nature of the employment. The workman was unloading coal barges on the Ohio River, and in passing from one to the other fell into the river and was drowned. Numerous decisions were cited to the effect that "such causes appertain to admiralty alone. The parties could not therefore by agreement confer jurisdiction upon a board of compensation by accepting the

terms in writing, of the compensation law." The Industrial commmission of Virginia took a like view with regard to a general worker on a dredge in the Potomac River, holding him to be a member of the crew of a vessel, and a maritime worker. (Harris v. Arundel Corp., Op. Ind. Com. Vol. V, p. 917.)"

There should be some uniform compensation law under which a sand and gravel company operating on inland waterways (navigable streams) could insure its employees, by which all employees could be entitled to the same or similar benefits now enjoyed under state compensation laws, which cannot be done under existing laws.

Government Explores Idaho

The lure of metals and the free life of the prospector has usually resulted in the development of metal mines and of metal-mining districts well in advance of possible Government exploration. With reference to most nonmetals, including coal, the situation is different. Such deposits are less eagerly sought and are slower in commercial development. Moreover, great bodies of them occur on Government-owned lands, and under the law such lands must be classified before any disposition of the valuable deposits they contain may be made.

Since 1909 the Government has been exploring the rich and extensive phosphate deposits of Idaho and adjacent states. Much of this country is sparsely inhabited and is as yet little explored geologically, but it is gratifying to note that significant mining developments have already taken place as a result of this exploration, and it is confidently expected that this region will ultimately support a large and prosperous mining community.

The Department of the Interior now announces the publication by the Geological Survey of a comprehensive professional paper of 450 pages on the phosphate deposits of southeastern Idaho, the richest known part of the great western phosphate field, which in Idaho alone comprises reserves of high-grade phosphate rock (65 to 84 per cent tricalcium phosphate) estimated at about five billion tons. The report is accompanied by elaborate and detailed colored geologic maps and geologic structure sections and contains many measurements and analyses which together make it possible to tell with considerable accuracy the surface distribution, depth, thickness, and quality of the phosphate beds in any particular tract of land and also the conditions affecting road construction, drainage, and settlement at any particular site. Much other information on phosphate and the phosphate industry is included, and other mineral resources of the region are also considered.

The report, which is entitled "Geography, Geology, and Mineral Resources of Part of Southeastern Idaho," by G. R. Mansfield, should also prove of interest to students and to technical and general readers. It reflects something of the atmosphere of pioneering days; it describes in detail the mountains and valleys of this part of the West, the climate, vegetation, resources, industries, and transportation facilities; it discusses the interesting geologic formations and structure and presents an interpretation of them; and it considers some of the broader problems that have arisen in connection with the exploration, such as the origin of the ancient phosphate-bearing formation, the complex erosional history of southeastern Idaho, and the building of the northern Rocky Mountains with their tremendous folding, fracturing, and sliding. The geographic and geologic information presented may furnish standards of comparison, it is hoped, for further and broader studies in the Rocky Mountain region.

Agricultural Outlook Report to Be Issued January 30th

A comprehensive report on the National agricultural outlook for the ensuing year will be issued January 30 by the Bureau of Agricultural Economics, United States Department of Agriculture. Following the issuance of the Federal report, a number of the State agricultural extension services are planning to issue State or regional reports for the use of farmers in applying the outlook information to individual farm needs.

Since the Department of Agriculture began the issuance of outlook reports in 1922, there has been increasing interest in this type of research and service work among agricultural extension organizations and farmers. Representatives of many of the State extension forces participate in the preparation of the National outlook report, and evidence accumulated by the Department of Agriculture indicates that a growing number of farmers use the National and State information in planning and organizing their farm business.

The Federal report is prepared by agricultural economists, statisticians, and market specialists on the basis of all available agricultural information which can be gathered by the department's worldwide organization for the collection of data on production, consumption, and general economic conditions affecting American agriculture. The report deals with domestic demand for farm products, foreign competition and demand, agricultural credit, farm labor, equipment, fertilizers, and the outlook for the leading crops, livestock, and livestock products.

U. S. to Canada Traffic Increases

A total of 342,201 automobiles from the United States entered the Province of Ontario during the season of 1927, spending $40,696,650, and represents an increase of 48.01 per cent over 1925.

RECENT DEVELOPMENTS IN THE MANUFACTURE AND USE OF CONCRETE MASONRY

By W. D. Allan
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A SURVEY of the concrete masonry units industry by the Portland Cement Association has just been completed and the summary shows that 4,140 plants have reported an output equivalent to 350,531,000 8x8x16 block in 1927. These figures do not include production of cast stone, staves and similar products that might properly be included as masonry material. We believe that the survey included 85 percent of the active plants and about 90 percent of the total output for the year. This is the first comprehensive survey of the industry which has been undertaken but it is hoped that it will be made each year and include all plants.

All masonry units, including block, brick and tile, were converted to 8x8x16 block for convenience, this being the most common size of unit, but the tendency in the industry for the last ten years has been toward smaller and lighter products. On the West Coast where production is increasing rapidly very few of the 8x8x16 block are produced. 3½x8x12, 5x8x12 and 6x8x12 tile are the most important units made. You doubtless can remember the 8x8x32 block that required two men to lay. A few years later the 8x8x24 supplanted the larger unit and was in turn replaced by the 8x8x16 block. While the later unit may have some disadvantages, it has popularized concrete masonry construction. However, the unit is heavier than the majority of brick masons care to lay and its size necessitates a great deal of cutting when used around openings and in skeleton construction.

The use of 5x8x12 tile is increasing more rapidly than any other product in the concrete masonry field. These tile weigh from 16 to 18 pounds and brick masons like to handle them because they are designed with hand-holes for convenience and the mortar beds are wide. These tile are particularly adaptable for back-up in bearing walls and in structural frames. The 5-inch height makes bonding with brick every six or seven courses very simple. With a small amount of cutting and a few brick any kind of a wall can be built economically with concrete tile.

However, the majority of you are not directly connected with the concrete masonry business, you are interested primarily in effect of this development upon the sand and gravel business. 350,531,000 8x8x16 block require over 5,000,000 yards of aggregate. Aggregate requirements for concrete masonry increased more than 700 percent since the war. The percentage of plants using bank-run, ungraded and dirty materials has decreased in almost the same proportion that the industry increased. Through the work of the Structural Materials Research Laboratories at Lewis Institute, and more recently, through the Portland Cement Association laboratory, we have been able to show products manufacturers the economy of using clean and properly graded materials. This has created a demand for aggregate from well equipped commercial plants.

While sand and gravel remains the most generally used aggregate in products plants, there has been, in several sections, a marked tendency toward the use of light weight aggregate such as cinders, Haydite and Sinter. Where commercially available and of good quality there aggregates make a very satisfactory product and have made notable progress. Cost of materials usually determines the aggregate that will be used in a given market. This cost does not apply to aggre-

*Presented before the National Sand and Gravel Association at Detroit, January 6, 1928.

A Storage Yard of Hume Concrete Pipe

gate alone but usually the combined cost of the cement and aggregate. A very cheap sand may be available in a given market and still not be economical for products plants if it is poorly graded and requires an excessive amount of cement to make a product of standard quality.

It appears to me that the most important service the sand and gravel industry can give the products industry is to study the needs of products manufacturers and the properties of the available aggregate and from this information furnish the products manufacturer with a graded material that will give the lowest material cost for a salable product of standard quality. This may require a special screening but it will usually pay the producer located within economical shipping range of important plants.

Rapid progress, in the industry, has not only been in total production but also in the number of large plants. Eight years ago there were few, if any, plants in the country producing as many as 1,000,000 block per year, but in 1927, 26 plants produced over 1,000,000 block per year each. Medium size plants are consolidating to form large economical and efficient plants. Small ones are being lost because they lack the ability to compete with their efficient neighbors. In the evolution of the products industry there has been a tendency on the part of manufacturers in passing from the back-yard stage to expend too much money in plant equipment. The pendulum has swung too far, and in the readjustment taking place at present, the tendency is toward less fixed capital and the operation of the plant two or three shifts a day to supply the peak demand. Not infrequently in the past plants have been built and equipped to take care of peak production when operating one shift a day. Under these conditions the equipment was operated about 35 per cent of the time causing high fixed charges and overhead. Frequently plants producing 150,000 block per year had fixed capital investments amounting to $40,000 or $50,000 when the same output could have been obtained at a lower cost per unit with an investment not to exceed $20,000.

You may have products manufacturers among your customers who are contemplating the rebuilding of their plants, or friends who plan on entering the business, who will come to you for advice or who would be glad to have your counsel. I would urge that you bring to their attention the importance of keeping fixed capital as low as consistent with economical manufacture of a quality product. This is not a plea for a return to the back-yard type of plant, for all of us know its evils, but it is a plea for a plant designed and operated for greatest profit, keeping in mind that the peak demand can best be supplied by operating two or three shifts per day rather than by installing equipment sufficient to take care of peak demand operating one shift a day and remaining idle from 40 to 60 percent of the time.

Since most of the work of the Structural Materials Research Laboratories was directed toward plastic concrete, the results were considered of little value to products manufacturers using the tamp method of production. By far the majority of products are made by the tamp method. A considerable number are cast, others are made in pressure machines and there are being developed in various sections of the country at present several vibrating machines which give promise of producing economically a quality product. Within the last few years much experimental work has been carried on by various Concrete Institute committees and the Portland Cement Association, and by progressive manufacturers. A review of their results shows that practically all of the laws developed by the Structural Materials Research Laboratories are applicable in tamped prdoucts. Sometimes the laws are not as positive as in plastic concrete but they indicate definite tendencies and can be used by products manufacturers as a guide for their production methods.

In the case of the water-cement ratio law, application is not so direct as in plastic mixes where within the limitations of workability, the strength of the concrete is determined by the ratio of the volume of cement to the volume of water, other things kept constant. It has been generally considered that all mixes used in tamping machines, where products immediately after tamping are removed from the molds, were on the dry or unworkable side of the water-cement ratio strength curve. I believe that it was E. W. Dienhart who first discovered that it is possible to handle concrete for tamped products which is so wet that it falls on the wet side of the water-cement ratio curve with the result that strength may be reduced. It is the tamping that gives workability and plasticity to the mix which before tamping was considered too dry to come under the water-cement ratio law.

A series of tests completed about two months ago, which will be reported soon by Committee P-1 of the American Concrete Institute, furnish positive proof of this fact for aggregates with fineness modulus of about 3.25. For coarser aggregates there was no falling off in strength to indicate that the concrete had been tamped into a plastic state. It has been customary to urge all tamped products manufacturers to add sufficient water to their materials to produce a distinct water web on the outside of the unit, this web being considered a definite measure of the quality of the products. With relatively fine aggregate this may be sufficient water to cause a falling off in the strength of concrete.

Demand for clean aggregates in all lines of concrete has been responsible for so much washing that in some cases a considerable amount of fine

materials passing a 48 mesh screen have been washed from the sand. This has resulted in a harsh mix with ordinary amounts of cement and has caused excessive web and corner cracking. In other cases production has been slowed down considerably because of the extra care required to remove the product from the machine to the curing room. This condition has in many cases led to the use of crushed gravel, sand screenings or admixtures to supply the deficiency of fine material in the sand.

Stripping to obtain plaster sand has also resulted in a material containing insufficient fines to make a sticky concrete that will stand handling. Use of any fine material under a 48 mesh screen in excessive amounts results in a loss of strength and is very objectionable but this does not preclude the use of a minimum of fines to give the stickiness necessary to prevent cracking and defective products. Whether 3, 4 or 5 percent of the material passes a 100 mesh screen depends upon the nature of the aggregate, the type of machine, method of handling and type of unit. Block made on the stripper type of machine with cells vertical seem less subject to web cracking from shortage of fines than the older type of face-down block with cells horizontal.

Roller conveyors for moving products from the machines to the curing rooms are satisfactory only when there is sufficient fine material to produce a "rubbery" concrete. Blocks 8 inches high are subject to more cracking than units 4 or 5 inches high if the aggregate is deficient in fines. Economy in products manufacture usually requires the use of the coarsest possible grading of aggregate consistent with the production of a salable product. This coarse grading should not be obtained at the expense of sufficient fines below 48 mesh screen to give workability and the stickiness required for ordinary handling.

During the past two or three years the growth of the products industry has been so great that very frequently block, brick and tile have been delivered to the job when only a few days old. Usually they had sufficient strength to meet building code requirements but under certain conditions serious cracking of the finished wall has resulted due to shrinkage of wet units.

Concrete products insufficiently cured, and wet when laid, shrink as they dry. In foundation work the drying is very slow and the units gain in strength more than enough to resist the shrinkage stresses developed. In above ground construction, however, the drying is usually more rapid and if the units are laid in a rich cement mortar the bond between them and the mortar is very strong. Tests show that the bond between concrete masonry and cement mortar is so strong that a masonry pier built of 1,500 pound concrete brick develops about the same strength as a pier built of 2,500 pound clay brick laid in the same mortar. Because of this bond the shrinkage stresses in each unit are transmitted to the next unit and so on until the stress is sufficient to crack the wall. The bond in other types of masonry is weaker and the shrinkage cracks develop in the mortar joints instead of transmitting the stresses to adjoining units.

The remedy is clear and many manufacturers have already equipped their plants to permit products to dry out thoroughly after curing. In some cases a hot blast of air is forced through the curing rooms after sufficient moist curing to develop the required strength. This method is not generally recommended and a much better procedure is to store the block under cover to dry after they have been wet cured to develop the strength and density required. The only danger to be avoided is that of allowing the products to dry out before they have received wet curing. We have stressed the importance of damp curing to develop the desired properties in concrete for so long that it, this requirement for drying, may be misinterpreted and confused with the curing process. The drying should not take place until after the wet curing has been provided.

You are probably interested in knowing that the Portland Cement Association plans for 1928 to help increase the use of concrete masonry. Three major uses of the product are housing, industrial buildings, and curtain and partition walls in skeleton construction. Practically all of our work as outlined for the next three years will be devoted to more aggressive merchandising. The foundation work for a merchandising campaign has been carefully laid during the past seven or eight years. Immediately after the war we started a campaign to standardize the quality. Specifications were developed, building codes revised and regular testing became common practice.

We soon found that the cost of manufacture had increased considerably because of improved and standardized quality. Our next campaign was to educate the industry in ways to cut the cost of manufacture without sacrificing quality. This required that schools be conducted in important centers to show how the proper selection of aggregates, mixing, tamping and curing could be used to produce units at minimum cost. Efficient plant layouts were prepared and given to manufacturers interested in building new or rebuilding old plants. The result of this seven years work was a quality product economically manufactured.

The remaining requirement is to increase the volume and this must be obtained through better and more aggressive sales methods, hitherto practically unknown to the industry. An industry that is valued at $70,000,000 a year and that has grown 700 percent since the war without much sales effort should be able to greatly increase its output through the adoption of intelligent sales methods.

Sales schools will be held during the coming year in all important masonry centers to show how manufacturers can increase sales. Advertising copy will be furnished. In some cases our own advertising will be of assistance and products men will be shown how and encouraged to cash in on it. We will urge manufacturers either as individuals or as local associations to employ salesmen to fight for every job. We will assist with the training of salesmen. If desired they can be sent to our headquarters in Chicago and given complete information regarding the product and how to present the merits of concrete masonry to architects, contractors and builders.

A series of eighteen house plans are being prepared for us by the Architects' Small House Service Bureau. Each of these will be run in at least 56 newspapers during the year. Manufacturers will be advised in advance of the date when each plan will appear in their local papers and they will be furnished with appropriate copy to tie into the news story.

Light weight tile manufacturers will be encouraged through special publications and fire tests so that a larger volume of their material can be sold for skeleton frame construction. One tile manufacturer in Los Angeles sold 900,000 tile for school house construction alone during the past year.

An inspection service conducted by the Underwriters' Laboratories on concrete block, and we hope in the near future on thin wall tile, will do much to build up the highest regard for concrete masonry in the minds of architects and builders.

The only thing remaining will be to improve the manufacturing and sales methods to cut cost of production and put this product on a favorable competitive basis. This is a problem that each local manufacturer will have to solve for himself. In its solution the sand and gravel producer will be an important factor.

Necessarily any discussion of this broad subject must be covered by hitting the high spots and this is all that I have attempted. I may have suggested points upon which you desire further information. If so, I will be glad to discuss any of them now, if your Chairman desires, or I will meet with you after this session. Sand and gravel producers can render a real service to the products industry by becoming thoroughly familiar with its problems. Any assistance you can render the concrete products manufacturer will help increase the present 5,000,000 cubic yards of aggregate to 10,000,000 cubic yards, which is one of our goals for 1928.

If we can help you at any time or if any of the products manufacturers on your list of customers are in need of help please feel free to get in touch with us and we are anxious to be of every assistance possible to the industry.

Asphalt Defined

"Asphalt," according to J. S. Helm, pres., Asphalt Association, "is one of nature's products and just as man has taken from bounteous nature the gold, silver, iron ore, coal, petroleum, copper and other products which have served his economic needs, so he is obtaining, as a boon to transportation, one of nature's most useful treasures in the form of asphalt. This product is not a creation of the synthetic chemist nor yet a by-product. It is a natural material invariably originating in petroleum and held in solution by it, no matter where or in what form it is found. And it is a fact that today 94 per cent of America's asphalt requirements are obtained from the great oil refineries. Asphalt is a material which enters directly into a larger yardage of pavements than other binding materials. It is a product practically necessary not only in asphalt pavements but in almost every other form of pavement, and finally, it is a product which is the one supreme salvaging medium to which we must look for saving our two to three billion dollars investment in macadam and gravel roads, through the application of a smooth, durable, dustless and water-proof wearing course."

Pit and Quarry Indispensable

M. H. McGaffigan, Acting Superintendent, Michigan State Cement Industry, Chelsea, Michigan, writes of Pit and Quarry as follows: "Quite a number of the technical articles the writer has enjoyed, pointing out as they have results obtained from actual experiences of varied character but yet pertinent to the industry as a whole. The raising of the curtain, so to speak, on what actually is transpiring throughout the country as a whole, gives the reader first-hand information which would be otherwise difficult to obtain, and your publication, to the writer's mind, is indispensable."

Congressman Holaday Offers Highway Aid

A bill, fostered by the American Motorists Association, and allied automobile organizations, for the construction of a nationwide system of hard surfaced roads has been introduced in Congress by Rep. William P. Holaday. The roads range in width from 20 to 60 feet. The measure provides that all highways, radiating out of cities over 200,000 population, must be 60 feet wide for 25 miles out from the city.

Automobile production in the United States during November was 133,202 passenger cars and trucks, compared with 256,300 cars and trucks produced in November of last year, according to monthly production figures of the Department of Commerce.

CLEANING AND REPAIRING OF CARS PLACED FOR LOADING OF SAND AND GRAVEL

By J. C. Buckbee,
President, Northern Gravel Company

RECORDS of the American Railway Association indicate approximately two million eight hundred thousand cars of sand and gravel and crushed stone were handled by the railroads of the United States during the past year. Presumably, most of this material was handled in gondola cars, at least for our present purposes I believe we can safely figure so, because while undoubtedly some hopper cars were used and some ballast cars, both of these classes of cars usually require some cleaning and attention on being placed for loading, although, in most instances, not nearly so much attention as the gondola car.

A carefully kept record of my own company, covering close to two thousand cars, indicates the labor cost of cleaning and patching the average gondola car to be fifty-six cents where labor costs forty-five cents per hour.

If this cost be typical of our industry, and I judge it to be approximately so, it is evident we spent, for cleaning and repairing cars during the past year, over one million five hundred thousand dollars.

Surely such a sum merits the attention of the industry, but before proceeding to a consideration of the causes of this expense and what may be done to reduce the same let us first consider what the expense means to the individual producer so that we may each have a rather better idea of what the problem means to our own business.

Let us take the case of a concern shipping five thousand cars annually: The expense of cleaning and repairing gondola cars would cost this producer, at the above rate, twenty-eight hundred dollars annually, or we may say, considering his season to be eight months, three hundred and fifty dollars per month.

Looking at the matter in the light of profits, let us say for instance that the average profit on a ton of washed sand and gravel is ten cents and the average loading fifty-five tons per car, making the profit five dollars and fifty cents per car. If the cost of cleaning and patching the car is fifty-six cents, as is the case with my own company, it is evident this expense amounts to over ten per cent of the profit.

The Bureau of Mines, of the United States Department of Commerce, states that the average price of sand and gravel F. O. B. cars at the plant in 1926 was sixty-one cents per ton. This is too high a figure for our section, where the average price is probably nearer forty cents per ton.

Taking such a figure as a base and fifty-five tons per car as an average load, the billing price of the load is twenty-two dollars, and it is obvious, if it would cost fifty-six cents to clean and repair the car, this cost amounts to over two and one-half per cent of the sales price of the material.

With the above figures in mind, let us now consider the causes of this expense and the remedies that may be applied to minimize the same.

Our plant is located on the Chicago and North Western Railway about thirty-five miles north of Milwaukee and is served with empties principally out of their Butler yard near Milwaukee, although we often get cars from their Fond du Lac yard. Both of these yards are what might be called "Concentration Yards"; that is, yards to which empties are routed for re-distribution, a common practice with most railways.

The Chicago and North Western Railway gives us most excellent service and their officers co-operate steadily in every way at their command, so we are satisfied that so far as our own company is concerned we receive the best the Railway has to offer, but we have made some suggestions to the Railway, which I will tell you about later, that we believe are going to be very helpful both to the Railway and to ourselves.

In addition to the cars of the Chicago and North Western Railway, we receive gondolas of practically every carrier in the United States. The cars we receive are of an almost endless variety of construction and type. About all that seems to be standard is the wheel gauge and the couplers, although, in general form, all of the cars are gondolas and intended for carrying bulk materials, so, to a large degree, it seems to the writer that the great variation in the design and construction is altogether unnecessary and steps should be taken by the railways, for their own good, to reduce the number of varieties of design and construction, for, obviously, such simplification would reduce their maintenance cost.

The cars reach us in all sorts of condition and containing all sorts of materials from the previous loading. They must be carefully cleaned and carefully patched before loading with washed sand and gravel, the cleaning being necessary because washed sand and gravel is a carefully prepared material for the making of concrete and must not be contaminated with any foreign material.

At our own plant we clean the cars with brooms and shovels, and if the car bottom be in good condition this is not ordinarily such an expensive job, but a great deal of the cleaning could be eliminated

if the railways would insist that the previous consignee of the car thoroughly clean the same before turning the car back to the carrier, and by making this a rule and insisting that their station agents see it is observed, we are satisfied much could be accomplished.

With car bottoms in good condition, the car is ready for loading with gravel immediately after cleaning, and where the cars have steel sides and bottom in good condition, is ready for loading with sand immediately after cleaning. With cars having wooden bottoms and sides, there are bound to be some cracks through which sand can escape in transit, especially from the bottom, and where the cars are in good condition we are able to satisfactorily close these cracks at small expense with a little pea gravel distributed by a shovel, the same being taken from the chute of the pea gravel bin as the car is placed for loading.

The cars that require the most attention are the so-called general service drop bottom gondolas, of which most every carrier seems to have a different variety, and these cars seem to suffer in service far more than the solid body car and reach us in all sorts of condition. Practically none of these drop bottom cars appear to have doors that close tight, and not only do some of the doors of the cars have cracks around the doors but the doors themselves are lower than the body of the car by from one to two inches, which leaves pockets in which foreign material such as coal, cinders, tan bark, etc., from the previous loading, remains and makes the cars very difficult to clean.

There seems to be an endless variety of mechanical devices for operating the doors of drop bottom gondolas, very few of which appear to be efficient. In many of the types several of the doors in the car will refuse to drop when the latching device is released for cleaning, and in many of the cars we have to use wedges or slugs in the door latching mechanism on closing the doors to be sure that the door will not let go in transit and drop the load.

The carrier should be interested more in this matter of dropping the load than the shipper because it not only means claims for loss of material, which must be paid, but derailments of an entire train have been caused by one or more doors on a gondola car dropping while the train was in motion.

A great many of the drop bottom gondola cars, in fact I should say the majority, placed for loading at our plant, which I have described above, I presume are about the same as experienced by all of the members of our industry, excepting, no doubt, that each producer has conditions to contend with that are peculiar to his own locality. However, I believe the description of the conditions is sufficient to proceed to a consideration of what may be done to reduce the expense, both for ourselves and for the carrier.

As stated above, the so-called drop bottom type of gondola car appears to be the source of the greatest expense. While, of course, it is desirable from the carrier's standpoint to have cars suitable for as many kinds of service as possible, it would seem equally desirable to have cars of minimum first cost and requiring minimum up-keep.

We have, therefore, suggested to our Railway that a survey of their business be made to determine if as many drop bottom cars are actually needed by their customers as the number kept in service by the carriers would seem to indicate.

It is our conviction that the drop bottom gondola idea has been carried way beyond any point of necessity and that the carriers could profit handsomely by re-building most of their older and less efficient drop bottoms into solid body cars.

We have observed that the majority of our customers use clam shell buckets and cranes for unloading washed sand and gravel, because with such cranes they are able to put the material into hoppers or trucks or into stockpiles and with the same crane re-load from stockpiles into hoppers or trucks.

Clam shell buckets are necessarily hard on cars, even when handled by experienced operators. We therefore suggested to our Railway that in repairing old cars or building new cars they install a wearing bottom of three inch plank laid lengthwise of the car over the two inch plank that is ordinarily laid crosswise of the sills of the car.

Most clam shell buckets close lengthwise of the car and tend to slide working lengthwise of the plank rather than to bite in and tear up the plank, as is the case when working on a bottom of the ordinary type of car where the planks lay crosswise of the car across the sills.

The general impression seems to be abroad that the drop bottom gondola is a self-unloading car, while as a matter of fact practically none of the drop bottom gondolas are completely self-unloading; that is, more or less hand-shoveling has to be done in most every instance to get all of the load out of the car. With the well designed hopper bottom cars or "battleships," however, the load is all discharged when the doors are dropped. Therefore we feel that, where the customer wishes to discharge the load through a trestle or into a track hopper, the self-cleaning type of car should be the one furnished by the carrier, except for very unusual and special service.

In our territory the use of clam shell buckets and cranes for unloading not only sand and gravel and crushed stone, but coal, seems to be steadily increasing, presumably because of the ability to stockpile material as mentioned above and I presume the experience in most parts of the country is similar to our own judging by the great number of locomotive cranes we see on every hand.

I think, therefore, this factor should be brought

(*Continued on page 99*)

WHAT ABOUT BUILDING CONSTRUCTION IN 1928

By C. Stanley Taylor

BUILDING records of the year just passed indicate that construction activity has continued at a pace almost equal to that of the record-breaking year, 1926. Including engineering projects and construction in the rural districts, it is evident that the total annual building volume of this country during 1927 has been well over seven billion dollars.

In January of 1927 The Architectural Forum issued a forecast that building activity for the year would be ten or twelve per cent less than in 1926. Events have proven this forecast to have been more than safely conservative, because the actual building construction, not including public works and utilities, was evidently only about six per cent less than in 1926. The difference between forecast and fact was therefore on the safe side and this fact is pointed out in view of the peculiar difficulties of establishing our forecast for the year 1928, which is here presented.

In attempting to establish this forecast of building activity for the year 1928, we face an unusual and paradoxical condition. On one hand we hear many casually or even thoughtfully expressed opinions indicating that there will be less building activity in 1928 than in several past years. On the other hand, The Forum's survey, on which this forecast is based, has been carried out in exactly the same manner used for the last seven years. Here we have actual evidence of work on architects' boards or seriously contemplated for the year 1928 —a volume of work which is testified to by 1,793 individual confidential reports from architects. These figures indicate that building will continue in 1928 at least in the same volume if not reaching even greater totals than 1927.

The forecast figures presented in the accompanying tabulation have been developed by applying a series of weighting factors to the allocated totals of direct reports received from architects. This calculating operation has been carried out in exactly the same manner used each year in establishing The Forum forecast. In view of the fact that there has been no deviation in this system and that it has produced successful results for six consecutive years, it would seem obvious that no drastic change in its operation could be expected this year unless some unusual series of business conditions developed suddenly to change the entire economic balance of the country.

If we seek further to analyze this apparently paradoxical situation (wherein many are predicting a sharp falling off of building in the year 1928 although most forecasts are to the contrary), we seem to discover controlling factors of an unusual nature, which, after all, may offer a simple explanation.

It is to be noted that those who are making casual predictions anticipating a considerable decrease in the building volume are located in large centers where there is perhaps an over-built situation which would color opinions. Probably, too, the idea of decreased activity in the building field is a natural reaction of the human mind which refuses to believe that good conditions can last so long. This conjecture is substantiated by the fact that most of those who are pessimistic about building activity are also pessimistic about national prosperity. Of course, if general business conditions become adversely affected and the confidence of the public is shaken, building activity will be materially influenced. The volume of building construction, and particularly the volume of contemplated construction as expressed by plan filing, is not a barometer of business conditions, as it is so often called. It is a mirror of business conditions, and it does not primarily affect prosperity in one way or another, but is in itself an effect of our general business situation. In prosperous times we build in huge volumes to meet not only the various necessary normal needs for new space, but to fulfill the requirements of increased standards of commercial and domestic housing which are in keeping with the ability to pay for greater comfort and utility.

With these thoughts in mind, is it not reasonable to believe that there may be a basic explanation for the evident paradox of contrary opinions as to building cativity? Perhaps we have not been passing through a real "boom"—perhaps the continued building activity which, as an examination of the accompanying chart "The Building Situation at a Glance" will show has been carrying on in increasing volume since 1922, is primarily based on greatly increased building requirements coupled with prosperous conditions which have provided the means for this great investment.

After all, the population of this country during the past ten years has increased by many millions for which shelter of all kinds must be provided. The tremendous volume of existing construction which has been added each year must of necessity require constantly greater building activity to take care of obsolescence and replacements. The fire losses grow greater each year in spite of efforts to curb them, but it may be noted that they do not grow larger in proportion to the total number of buildings. They grow larger because the total area of risks has been tremendously increased. Naturally, replacements to meet fire losses must grow larger as the requirements become greater.

We have also to consider seriously the greatly increased standards of living. The average family requires better shelter with a greater degree of attractiveness, comfort and utility. Similarly in business buildings of all kinds, builders must meet a demand which has grown amazingly in respect to the factors of quality and efficiency.

We predict, therefore, that the building activity of the year 1928 will approximately equal that of 1927 and that over the next few years there will be no general collapse of the situation but rather a gradual return to a new normal much higher than that established in any previous decade.

Of course, there will be changes in the totals of various types of building which go to make up this volume of building. An examination of the following tabulations will serve to give some idea of the 1928 requirements for new construction as compared with those of a year ago. This expression is in both instances the result of similar methods used by the Architectural Forum for obtaining such information. Consequently, the percentages given should constitute a fairly accurate gauge of national requirements for various types of buildings and those of the geograhpical divisions presented in the tabulation.

Northeastern States

Type of Building	Requirements for New Buildings by Percentages 1927	1928	Change
Automotive	2.5	5.4	+2.9
Banks	4.5	3.4	−1.1
Apartments	6.	3.3	−2.7
Apartment Hotels	2.	.2	−1.8
Clubs, Fraternal, etc.	3.	3.4	+ .4
Community and Memorial	1.1	1.	− .1
Churches	10.9	6.4	−4.5
Dwellings (Under $20,000.)	3.	6.4	+3.4
Dwellings ($20,000 - $50,000.)	2.	3.7	+1.7
Dwellings (Over $50,000.)	2.	2.8	+ .8
Hotels	5.6	6.9	+1.3
Hospitals	4.8	7.3	+2.5
Industrial	11.9	5.8	−6.1
Office Buildings	8.9	8.5	− .4
Public Buildings	8.	7.8	− .2
Schools	15.	13.6	−1.4
Stores	1.4	3.8	+2.4
Theatres	5.4	7.	+1.6
Welfare, Y.M.C.A., etc.	2.	3.3	−1.3

North Atlantic States

Type of Building	Requirements for New Buildings by Percentages 1927	1928	Change
Automotive	2.1	3.9	+1.8
Banks	4.5	4.2	− .3
Apartments	18.5	20.	+1.5
Apartment Hotels	6.6	3.3	−3.3
Clubs, Fraternal, etc.	3.5	2.6	− .9
Community and Memorial	1.6	.8	− .8
Churches	5.6	2.9	−2.7
Dwellings (Under $20,000.)	2.3	4.4	+2.1
Dwellings ($20,000 - $50,000.)	2.2	4.	+1.8
Dwellings (Over $50,000.)	1.9	2.6	+ .7
Hotels	5.2	6.2	+1.
Hospitals	7.1	6.	−1.1
Industrial	7.5	4.6	−2.9
Office Buildings	10.9	8.	−2.9
Public Buildings	5.7	7.1	+1.4
Schools	8.1	11.4	+3.3
Stores	2.4	3.1	+ .7
Theatres	3.	2.5	− .5
Welfare, Y.M.C.A., etc.	1.3	2.4	+1.1

Southeastern States

Type of Building	Requirements for New Buildings by Percentages 1927	1928	Change
Automotive	4.6	4.8	+ .2
Banks	2.3	1.3	−1.
Apartments	8.4	8.2	− .2
Apartment Hotels	3.2	2.9	− .3
Clubs, Fraternal, etc.	5.2	1.7	−3.5
Community and Memorial	1.	.3	− .7
Churches	6.9	7.4	+ .5
Dwellings (Under $20,000.)	4.	5.1	+1.1
Dwellings ($20,000 - $50,000.)	4.2	4.7	+ .5
Dwellings (Over $50,000.)	1.1	4.	+2.9
Hotels	15.	11.7	−3.3
Hospitals	5.	5.1	+ .1
Industrial	2.	4.2	+2.2
Office Buildings	5.	5.8	+ .8
Public Buildings	4.	2.9	−1.1
Schools	13.8	21.6	+7.8
Stores	8.	3.	−5.
Theaters	4.	2.5	−1.5
Welfare, Y.M.C.A., etc.	2.3	2.8	+ .5

Southwestern States

Type of Building	Requirements for New Buildings by Percentages 1927	1928	Change
Automotive	2.8	4.8	+2.
Banks	2.	2.8	+ .8
Apartments	8.	6.2	−1.8
Apartment Hotels	2.	3.6	+1.6
Clubs, Fraternal, etc.	4.	4.1	+ .1
Community and Memorial	5.2	1.5	−3.7
Churches	10.2	5.8	−4.4
Dwellings (Under $20,000.)	3.5	4.5	+1.
Dwellings ($20,000 - $50,000.)	4.	3.4	− .6
Dwellings (Over $50,000.)	1.5	3.1	+1.6
Hotels	10.8	12.5	+1.7
Hospitals	5.2	5.9	+ .7
Industrial	5.3	3.4	−1.9
Office Buildings	13.7	15.9	+2.2
Public Buildings	2.9	4.9	+2.
Schools	12.5	12.8	+ .3
Stores	2.	2.2	+ .2
Theaters	3.2	1.	−2.2
Welfare, Y.M.C.A., etc.	1.2	1.6	+ .4

BUILDING TYPES	N. EASTERN STATES	N. ATLANTIC STATES	S. EASTERN STATES	S. WESTERN STATES	MIDDLE STATES	WESTERN STATES	U.S.A.
Automotive	$16,702,000	$68,716,000	$8,214,000	$17,554,000	$67,605,000	$18,640,000	$197,431,000
Banks	10,674,000	72,693,000	2,278,000	10,202,000	34,300,000	7,247,000	137,394,000
Apartments	10,437,000	347,500,000	13,862,000	22,400,000	186,400,000	72,230,000	652,829,000
Apartment Hotels	572,000	56,787,000	4,970,000	12,935,000	105,987,000	36,267,000	217,518,000
Club, Fraternal, etc.	10,557,000	46,287,000	2,937,000	15,000,000	86,742,000	14,440,000	175,963,000
Community and Memorial	3,146,000	13,400,000	580,000	5,265 000	41,760 000	10,645,000	74,796,000
Churches	19,860,000	48,740,000	12,635,000	20,900,000	71,367,000	37,640,000	211,142,000
*Dwellings (Below $20,000)	19,780,000	76,730,000	8,700,000	16,360,000	49,400,000	26,372,000	197,342,000
Dwellings ($20,000 to $50,000)	11,420,000	69,210,000	7,935,000	12,150,000	37,610,000	24,640,000	162,965,000
Dwellings (Over $50,000)	8,700,000	44,935,000	6,720,000	11,345,000	31,210,000	16,660,000	119,570,000
Hotels	21,487,000	107,272,000	19,950,000	45,175,000	105,200,000	42,917,000	342,001,000
Hospitals	22,724,000	104,210,000	8 715,000	21,320,000	110,114,000	39,200,000	306,283,000
†Industrial	18,215,000	79,362 000	7,100.000	12,222,000	121,000,000	22,917,000	260,816,000
Office Buildings	26,376,000	139,674,000	9,854,000	57,473,000	263,413,000	87,720,000	584,510,000
Public Buildings	24,207,000	122,761,000	4.893,000	17,869,000	132,171,000	28,900,000	330,801,000
Schools	42,371,000	197,613,000	36,827,000	46,282,000	163,413,000	82,666,000	569,172,000
Stores	11,780,000	54,776,000	5,103,000	8,086,000	39,763,000	26,713,000	146,221,000
Theaters (All Types)	21,920,000	43,114,000	4,167,000	3,777,000	71,620,000	17,340,000	161,938,000
Welfare Y.M.C.A., etc	10,140,000	41,614,000	4,700,000	5,731,000	38,246,000	6,143,000	106,574,000
TOTAL VALUE OF NEW BUILDINGS	$311,068,000	$1,735,394,000	$170,140,000	$362,046,000	$1,757,321,000	$619,297,000	$4,955,266,000

New Construction Under Architect's Specifications — As shown in above tabulation	$4,955,266,000
*Small Dwellings Not Designed by Architects — Estimated about 80% of total	789,368,000
†Industrial Buildings Not Designed by Architects — Estimated 50% of total	260,816,000
Other Buildings Not Designed by Architects — Estimated at 10% of total after deducting above two classifications	499,678,000
TOTAL ESTIMATED EXPENDITURE FOR NEW BUILDINGS IN 1928	$6,505,128,000 (Not Including Public Works and Utilities)

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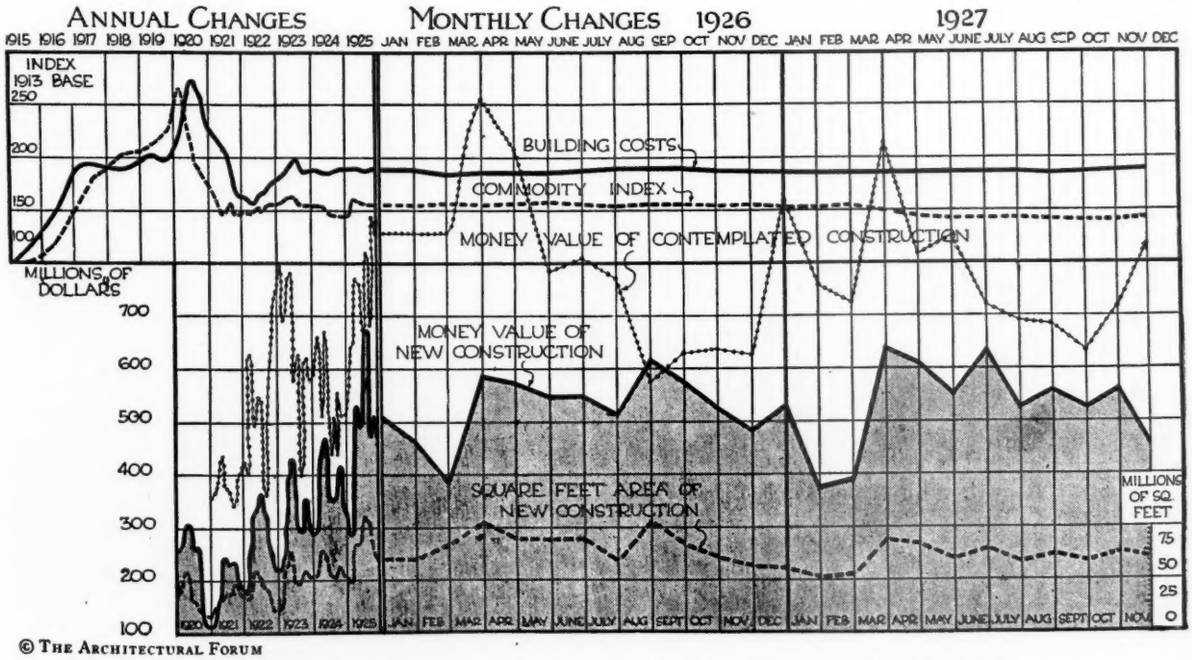
DETAILED FORECAST *of* NEW BUILDING CONSTRUCTION *for* 1928



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BUILDING ACTIVITY *in the* UNITED STATES SINCE 1915

Middle States

Requirements for New Buildings by Percentages

Type of Building	1927	1928	Change
Automotive	3.2	3.8	+ .6
Banks	2.6	1.9	— .7
Apartments	10.	10.6	+ .6
Apartment Hotels	3.	6.	+3.
Clubs, Fraternal, etc.	5.	4.9	— .1
Community and Memorial	2.	2.4	+ .4
Churches	6.	4.1	—1.9
Dwellings (Under $20,000.)	2.	2.8	+ .8
Dwellings ($20,000 - $50,000.)	2.4	2.1	— .3
Dwellings (Over $50,000.)	1.1	1.8	+ .7
Hotels	5.7	6.	+ .3
Hospitals	4.9	6.3	+1.4
Industrial	8.6	6.9	—1.7
Office Buildings	16.6	15.	—1.6
Public Buildings	4.	7.5	+3.5
Schools	13.6	9.3	—4.3
Stores	1.6	2.3	+ .7
Theaters	5.8	4.1	—1.7
Welfare, Y.M.C.A., etc.	1.9	2.2	+ .3

Western States

Requirements for New Buildings by Percentages

Type of Building	1927	1928	Change
Automotive	3.6	3.	— .6
Banks	2.	1.2	— .8
Apartments	9.8	11.7	+1.9
Apartment Hotels	4.3	5.9	+1.6
Clubs, Fraternal, etc.	6.3	2.3	—4.
Community and Memorial	1.9	1.7	— .2
Churches	6.2	6.1	— .1
Dwellings (Under $20,000.)	3.	4.3	+1.3
Dwellings ($20,000 - $50,000.)	2.3	4.	+1.7
Dwellings (Over $50,000.)	1.9	2.7	+ .8
Hotels	11.3	6.9	—4.4
Hospitals	3.9	6.3	+2.4
Industrial	2.9	3.7	+ .8
Office Buildings	11.6	14.2	+2.6
Public Buildings	9.6	4.7	—4.9
Schools	13.9	13.3	— .6
Stores	2.1	4.1	+2.
Theaters	2.4	2.8	+ .4
Welfare, Y.M.C.A., etc.	1.	1.	

National Percentages, U. S. A.

Requirements for New Buildings by Percentages

Type of Building	1927	1928	Change
Automotive	2.8	3.9	+1.1
Banks	3.3	2.8	— .5
Apartments	12.5	13.2	+ .7
Apartment Hotels	4.3	4.4	+ .1
Clubs, Fraternal, etc.	4.3	3.5	— .8
Community and Memorial	2.	1.5	— .5
Churches	6.5	4.3	—2.2
Dwellings (Under $20,000.)	2.4	4.	+1.6
Dwellings ($20,000 - $50,000.)	2.4	3.3	+ .9
Dwellings (Over $50,000.)	1.9	2.4	+ .5
Hotels	6.9	6.9	
Hospitals	5.6	6.2	+ .6
Industrial	7.3	5.3	—2.
Office Buildings	12.7	11.8	— .9
Public Buildings	5.6	6.7	+1.1
Schools	11.7	11.5	— .2
Stores	2.2	2.9	+ .7
Theaters	3.9	3.3	— .6
Welfare, Y.M.C.A., etc.	1.7	2.1	+ .4

The national percentages indicated for 1928 show greater activity in the construction of automotive buildings, residential buildings of all kinds, public buildings and welfare buildings. There is evidently to be a decrease in the amount of bank building, club and fraternal buildings, community buildings, churches and office buildings. Hotels and apartment hotels are evidently to develop approximately the same volume. School building will be approximately the same, while the demand for theaters shows a slight falling off.

Examining comparative conditions of demand for new buildings in the different geographical sections of the country as presented in these tabulations, we find the more striking changes to include a developed demand for automotive buildings in the Northeastern States with a considerable increase in the North Atlantic and Southwestern States. We find the requirements for bank buildings falling off everywhere except in the Southwestern States. The figures for apartment buildings indicate a sharp drop in requirements in the Northeastern States to almost half the total of last year. On the other hand, in the North Atlantic and in the Western States there is a slight increase in requirements. Apartment hotels show a sharp falling off in the North Atlantic States but double the requirements of last year in the Middle States. While the demand for apartment buildings has fallen off sharply in the Northeastern States, the requirements for individual dwellings of all types have increased materially, particularly for dwellings under $20,000.

In the hotel field the Northeastern and North Atlantic States indicate an increased demand in spite of the great activity which has taken place in this section of the country. There is an increased demand in the Northwestern States for new hotels but a sharp falling off in the Western States. The total indicates exactly the same percentages for 1928 as shown in 1927, which is somewhat unexpected as the hotel industry has not been looking forward to as much building activity in 1928 as in 1927. Of course, it may be that economic conditions in the hotel field will prevent the carrying out of a number of projected operations, but on the other hand, there will unquestionably be the greatest volume of remodeling ever known to this particular industry.

Other interesting comparisons will be found in studying the figures shown for the various types

of buildings. For instance, the Southeastern States indicate a greatly increased demand for school buildings, while in the Northeastern and Middle States, there has evidently been a falling off of requirements for educational structures.

It is predicted that building activity during the year 1928 will carry along in a much stronger manner than has been generally anticipated and that any decrease in volume which might be the result of lessened activities on the part of speculative builders will in turn be offset by a number of large investment and institutional projects which have been held in abeyance during 1926 and 1927.

Cuba to Build Greatest Road

One of the largest road building projects ever undertaken, representing an investment of $75,000,000 and employing an army of 5,000 men, has been contracted by Warren Brothers and work has been started.

Bisecting the island of Cuba, the new roadway will extend 700 miles. In length it will double the historic Appian Way which was laid down in Italy 2,000 years ago. It will be twenty feet wide in the country and will widen to twenty-six feet in the cities.

Warren Brothers have assembled in Cuba the largest road building equipment ever brought out for an undertaking of this kind.

When completed the highway will connect Guane of the Pinar del Rio Province with Santiago de Cuba. It will be known as the central highway. Five years will be required for construction. Under terms of the agreement, Warren Brothers have deposited $1,000,000 with the Cuban government as their guaranty to finish the work.

The Cuban government has already appropriated $3,400,000 for the new central highway and expects to pay for it in full within six years, through taxes on gasoline vehicle sales and other taxes. Cuba has been collecting $18,000,000 a year from these sources and is expected to collect even more in future years. It is quite likely, however, that Cuba will float an American bond issue to pay off the cost in full.

Southwest Road Show and School

Preparations are being made for the biggest and best Road Show and School ever held in the Southwest—the Third Annual Southwest Road Show and School—which will be held at Wichita, Kansas, for four days beginning February 21, 1928. This Show, which started two years ago, has grown in popularity and now covers a territory of fourteen states. An extensive Federal Government Exhibit will comprise one section of the show, and in addition, a number of State Departments will have exhibits. Reservations have already been made by a large number of the leading manufacturers and distributors of Road Building and Maintenance, as well as Construction Machinery, materials and equipment. The management of the Show has succeeded in securing the cooperation of the railroads, which will grant reduced rates, and the leading hotels, all of which will do their best to provide adequate accommodations as no other convention or meeting will be scheduled for the week of the Show.

Federal Aid Highway Program

A total of 63,756 miles of Federal-aid highways have been completed under the Federal-aid program, up to December 1, according to figures, as of that date, just announced by the U. S. Bureau of Public Roads. The total cost for the construction of this mileage was $1,218,630,014, of which the Federal Government's share was $538,187,766.

Data, compiled by the American Motorists Association, shows that on December 1st, Nebraska was leading all other states in highway construction under the Federal-aid program for the forthcoming fiscal year of 1928. On that date, Nebraska had under construction, 1,314 miles of Federal-aid road. Other states in the order named follow:

Kansas	787	Arkansas	223
South Dakota	772	New Mexico	219
North Dakota	755	Nevada	186
New York	655	Georgia	182
Indiana	534	Florida	176
Illinois	504	Utah	160
Alabama	457	California	156
Iowa	447	Louisiana	147
Kentucky	439	Idaho	131
Michigan	400	Virginia	116
Texas	375	Massachusetts	115
Pennsylvania	370	Maryland	104
Ohio	352	North Carolina	92
Mississippi	337	New Jersey	85
Wisconsin	326	Oregon	74
Oklahoma	309	Connecticut	69
Minnesota	292	Arizona	67
Colorado	285	Washington	66
Montana	283	Vermont	45
West Virginia	278	New Hampshire	42
Missouri	273	Maine	41
Wyoming	258	Delaware	31
South Carolina	253	Rhode Island	16
Tennessee	249		

"For 1928 the figures show that 3,899 miles of Federal-aid highway will be under construction and completed during the year. As large as these figures seem, it is not more than enough new highways to park our yearly production of new automobiles which will be built in 1928, if they were placed end to end," according to J. Borto Weeks, President of the American Motorists Association.

"A larger building program, both for the states and the Federal government, is urged by the American Motorists Association, which believes that the government should not be content with building just enough highways to meet the current production of automobiles each year, but we believe that the building program each year should be enlarged enough to take care of the current needs.

MAKING THE SAFETY PROGRAM AN ASSET

By J. N. Curtis
Assistant to General Manager, Portland Cement Association*

CEMENT was first manufactured in vertical kilns and the rotary kiln was later introduced, followed by larger grinding equipment and other improvements, greatly increasing mill power and capacity. These changes introduced new hazards and experiences in this regard merely followed American industry.

The first efforts were directed toward safeguarding machinery and considerable progress was made. Later rules were formulated and printed on cards and signs, and bound into rule books in thirteen different languages, but the big thing which we did was to keep accurate statistical record of accidents. The availability of statistics is one of the chief reasons for our success.

Statistics shows us the causes of most accidents; they show us where our money can be most profitably employed and where we need not spend it. They have shown us that efforts designed to interest and educate workmen are most profitable.

Today probably 90 per cent of our time is spent on work of this kind, most of it aiming to impress workmen with the idea that the injury hurts himself and his family more than anyone.

Executives and Companies Must Be Interested

In attempting to educate workmen in the cement organizations, we have found that the first move should always be to secure the personal interest of the chief executives and companies involved. It has been a great help to us to interest practically 100 per cent of the active executives in the cement industry.

We hold regional safety meetings which are attended by representatives of nearby plants. General safety subjects as well as methods of preventing specific accidents are discussed. The attendance varies from 50 to 300, usually including the superintendent and chairman of the mills and half a dozen of the more responsible men. I use the word "mill" to include both the quarry and mill.

We do not issue safety posters as we find it more economical and effective to use those of the National Safety Council. We print our Safety Magazine six times a year and it is read regularly by most of the employees in all the mills. Our mills subscribe for the various trade magazines in which the subject of safety is frequently discussed.

Description of Accidents of Value

One of our best helps is our monthly mimeographed list of accidents which gives a general description of our progress during the year and comparisons with the previous month and year, and brief descriptions of the most significant accidents which occurred. Copies are sent to all plants and relayed to workmen who are doing work of the same kind as the injured men. These accidents are bulletined through the plant and carried by the foremen to the men who are doing similar work and a check is made on their departments. We find that this method impresses workmen and helps them to develop common sense ideas about working safely.

In our special campaigns the general idea is always either to stir up competition among the men or to get them to cooperate. We conduct a big competition in our industry every year, known as our annual trophy contest. The plant which operates through the year with the least man hours lost is entitled to the Portland Cement Association trophy, a handsome block of concrete, weighing about 16,000 pounds and prepared from designs made at the Art Institute of Chicago. It is hand tooled of the finest cut cast stone and makes a handsome monument. The prize also includes the expenses of two men to the meeting of the Association where the formal presentation is made. Four years ago we awarded the first trophy to a plant which had three accidents during the year. Two years ago, two of our plants completed the year without a single lost time accident and a trophy was awarded to each of them. Last year this experience was repeated and in addition several plants lost out by only one or two minor mishaps. This year to date we have seventeen mills that have not had a lost time accident and there is much speculation as to what the figures will be at the end of the year.

As another example of our competitive efforts most cement mills enter into the Bureau of Mines contest each year for the Sentinels of Safety trophy. A quarry owned by one of the cement companies won that prize awarded this year and of the fourteen quarries which completed the period with a perfect record twelve were cement mill quarries.

Many Accidents Unnecessary

I realize that self praise is an extremely dangerous thing in safety work and I do not mention our victories with the thought of giving comfort to the cement men. On the contrary the strides they have made ought to show them how unnecessary a lot of our accidents have been. I do want to point to our achievement as evidence that progress is not only possible, but sure to follow well organized effort. When we compare present accidents with

*Abstract of address presented before the All-Ohio Safety Conference, Columbus, Ohio, November 10, 1927.

those we have eliminated, there is no difference between them in type and no excuse for tolerating the present accidents.

I like the cooperative type of work which is to get one fellow interested to such an extent that he will get others, and the process will be continued until the entire organization, or industry is enthusiastic about safety.

Our June No-Accident Campaign demonstrated the application of the cooperative principle. It started with a circular letter to executives of each cement company asking them to sign a statement which says in substance: "I am for stamping out industrial accidents." "Our company will do everything we can to that end." "Our company will not hire careless men" and "We are behind the June No-Accident Campaign and we empower our superintendent to take any steps in his judgment necessary to insure the success of this drive."

The executives promised to do everything possible to prevent accidents during the campaign. After this, it was an easy matter to get superintendents to sign a statement promising to pull the plan through the month safely. In returning their statements, the superintendents were asked to give the number of their foremen and department heads. Then statements were sent to mills for the department heads and foremen to sign in which they agreed to assume a large measure of responsibility for their men and promised to explain the campaign to every individual. When all of these enrollments had been returned we sent each superintendent a supply of pledge cards sufficient for every man on his payroll.

Pledge Cards of Value

On the last of May or the first of June, mass meetings were held in the cement plants at which the workmen's pledge cards were signed. You can imagine the thrill that came to us when thousands of these cards were received. We have used several thousand of them for exhibit purposes and must have about 30,000 on file. We had a reduction from 192 lost time accidents in 1926 to 50 similar accidents in June, 1927. Fatal accidents were reduced from 6 in June, 1926, to one in June, 1927. These figures include 164 mills. 133 cement mills completed the month without an accident; 50 of these mills had never operated 30 days without an accident.

One of the greatest causes of lost time accidents in quarries last year was that brakemen occasionally put their hands or arm inside a car and allowed the stone to roll on them; occasionally a man was careless enough to ride on top of the load of stone which shifted and let him down. There is a shrinkage in accidents, due to premature explosions, and we feel that the attention given to this matter the last three or four years is bearing fruit. About one-fifth of all accidents in the cement industry have been in the quarries and about one-fourth of all the lost time accidents—indicating that the quarry accidents are relatively more severe than those in other departments.

Accidents Have Been Reduced

During the first ten months of 1926 six quarries, reporting in Ohio, had nineteen accidents involving 448 days lost time. There was one partial disability and one fatal accident. In the corresponding ten months of 1927, there were ten accidents causing 75 days lost time with two or three accidents to be reported. These latter will probably boost the 1927 figures a little but there has been a most gratifying drop. There were no permanent disability or fatal accidents in the Ohio quarries during the first ten months of 1927. Figures for the entire country show that cement mill and quarry accidents are running about 20 per cent lower than last year. There are about 500 fewer accidents right now than there were at this time in 1926.

One of my hobbies, is to build up strong safety committees in mills and quarries. Aside from promoting safety, it can do much to extend comfort and help in places where officials and the company can do little. A safety committee that can keep down accidents is the very best possible organization to keep up the morale.

While the immediate objective of a safety organization will always be to keep workmen from getting hurt, a good organization of that kind produces a group of fellows who can exert their good influence at every opportunity and clean up the community in which the mill is located. We are interested today not only in keeping our workmen out of the wheels of machinery, keeping them from getting hurt and discouraged, but we want them to have good roofs over their heads and we want to see the towns in which they live cleaned up, sewered, paved and developed into model communities, with good schools, churches, recreation, playgrounds, and effective measures in force to keep both the grown-ups and children from getting hurt. Here is a broad and constructive field in which the safety committee can work. If it does its work effectively the industrial communities around our quarries and mills will soon be healthier, cleaner and better.

The safety committee may find helpful service in furnishing the diversion that is necessary to keep people satisfied. The demand for entertainment is seldom supplied in mill towns. The demand for education among workers provides the committee with another fine field. In about 25 mills and quarries in our industry Americanization courses are going on in most cases under the supervision of the safety director. This work usually includes English, arithmetic and other essentials that will help the workman to make his way in

the world. Through these and similar possibilities the safety committee can do much to build character.and make men feel responsibility.

I sat in a safety meeting the other day to which two new men had been invited. Their surprise could be seen as they sat there and listened. These men probably went out of the meeting with a better idea of their responsibilities and a broader sense of interest and satisfaction that they had seen a meeting conducted along orderly parliamentary lines. The next time they come they will learn even more about these things. After a while one may be selected for service on some sub-committee; the other may be appointed outside or inside inspector, and will be called upon to inspect the mill and make a report. Few serious-minded workmen could fill this position without feeling a sense of pride in the splendid operations of the mill and intense interest in helping to promote the orderly operation of the industry.

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He could always sell the thing he didn't have for less than the other fellow, and he made promises of the impossible with an engaging indifference to the results that drove the financial department mad. That man is passing out of the sales picture.

In developing this new science of sales management, it is well to realize that we will progress with old organizations only so far as tradition will permit. "A man is a good deal like a tack; he can go only so far as his head allows."

Effect of Attitudes

What does an attitude mean? How can it influence?

The attitude of management toward any problem is critically important. Analyze the effect of these attitudes. The production-minded industries make great improvements in production methods, but they generally sell on price, and rarely open up new markets or get the most out of old ones.

The furnace may be able to heat this room to 90 degrees. There may be plenty of coal in the cellar, as Mr. Roger Babson once said. If the janitor, however, thinks that 65 degrees is warm enough, or if he is ignorant, unintelligent, lazy, or indifferent, the tenant is likely to be uncomfortable. The furnace capacity, or the supply of coal is not alone the measure of the heat, but it is the attitude of mind of the janitor that controls the temperature of the house. His attitude controls the physical comfort of the tenant.

Hasn't the dominant idea in your plants been one of—production? How many men have you on your staffs thinking, planning, and testing new and better ways of selling—new and better ways of marketing—making sure that the buyer got what he should have? How many? How much scientific thought have you given to your marketing problem?

It happens that I have been in two specialty lines—the cash register and the adding machine. Each of these has for years been spending over a quarter of a million dollars annually studying the developing tendencies in their markets. Even now they have new ideas that will not be marketed for ten years. The point is that they are consciously developing and anticipating their market for the years and decades to come. Even now they are training their men in how to meet and guide this demand.

You may say, "These things are part of the sales job. When the demand arises we'll meet it." Granted, but doesn't the whole organization from president, board, officers, down to the office boy exist for just one thing—to *create demand?* To *make demand? To create more demand in order to have more to produce?* Don't you know that demand for kinds and types of product can be created —that it can be controlled?

You can create an attitude of acceptance—indifference or hostility on the part of the owner, engineer or builder.

It is a man's mental attitude toward the cigar problem and the dollar bill in his pocket which determines whether he buys a ten-cent or a fifteen-cent cigar, or a pack of cigarettes.

"Over-production," "under - production," they used to say controlled the prices and demand. But what causes over-production or under-production? Bad education—poor knowledge of fundamentals. We want preventive remedies, not merely cures. "The crops—the money market—that's the reason," said others. Farmers over-crop. Why do they over-crop? Farmer minds in contact with realities or falsities?

You see how important people, and how much less important things, are becoming? People, after all, make trade. Their condition of mind, which governs their freedom of choice, is responsible for most business. A man with $10 in his pocket is often a better prospect than a man with $100 in his pocket. It depends on his state and attitude of mind.

To me that attitude of mind is one of the most vitally important things in your business. The consumer of *your* product is not in the best frame of mind about your product and your outlets. Standardization of service will have to come among the funeral directors and there will have to be more education among the consumers.

Autos and Mental Attitude

The automobile business has been built on an attitude of mind. It has been the attitude of mind of the American man and woman toward the motor car that has made it difficult for the old-style economists to foretell the saturation point, that fleet-

ing point which has for nine years eluded the statistician. The American man and woman were willing to forego clothes, shoes, jewelry, and many other things, for an automobile. The attitude of mind of the American family settled the motor sales problem and unsettled the figures of the statistician. The forces of advertising and selling helped to create that attitude of mind. The concrete road builder made his sales to an auto-minded public. The roads were built and the auto sales continued to leap. The statistician had to begin all over again year after year, because of the changing mental attitude of the consumer.

Thus, it is important for any manager to realize the power of those psychological factors that lie outside the money volume, and to keep in touch with the tendencies—the ebb and flow—of public acceptance of any product.

There is a large present market, and a larger possible market, that depends on the freedom of choice which dominates all markets. This freedom of choice is conditioned and measurably controlled by the state of mind of the buyer, and this state of mind is governed by the degree of education and information of the buyer and the service and sales ability of the seller.

The attitude or state of mind is moulded by advertising and sales and service.

Think, for a moment, what has happened in silk stockings! The sale of silk stockings has increased 98,500 per cent from 1899 to 1921, much to the discomfort of cotton and wool manufacturers, but to the joy of the rest of mankind/ That did not happen without direction. The cause was simple. Propaganda—fashion—advertising—sales.

The sale of bathtubs has increased 1000 per cent in the last twenty years while soap sales have increased 250 per cent per capita in the same time. That did not just happen! Look into the advertising pages for one reason. The governing of consumption by the attitude of mind is shown in the varying standards of living. It requires eight times the amount of soap to keep an Englishman as clean as he wants to be as it requires to keep a Russian as clean as he is willing to be.

Education of the Market

After all, the problem of educating one's market, I think you will agree with me, is the problem of the seller. It is not the customer's fault if he doesn't buy or doesn't buy what you want him to buy. Our whole American distributing process accents *salesmanship* and not *buymanship*, no matter how greatly the latter has developed within the past ten years, largely because the successful seller has objectified his effort, that is, earnestly endeavored to *understand the real needs of his market* to a point where he knew much more about those needs in relation to the product he was selling than the buyer did himself.

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to the attention of the carriers and a request made of them to have a survey made of their business to determine the actual needs of their customers for both solid bottom cars and hopper bottom cars.

Obviously, a solid bottom car will cost the carriers less and be far easier and cheaper to maintain than a drop bottom gondola, so if such cars could be substituted, to a large degree, for the many unefficient drop bottoms now in service, many thousands of dollars would be saved annually by both the carriers and our industry.

From the customers' standpoint, patched cars are a source of nuisance and expense, for the short boards get into the sand and gravel, choking mixers, chutes, etc. These short boards also at times causes a drop door to hang, which delays and adds to the expense of unloading and frequently results in expense to the carriers, as the men, in an effort to free the doors, use crowbars and hammers, often damaging the equipment.

The boards over holes in a car often shift in transit and the car arrives at destination short of its load. This entails claims being made by the shipper or the consignee and means unnecessary expense for both the carrier and the carrier's customer.

It is the writer's opinion that the above subject has unfortunately been given far too little study by both our industry and the carriers, and that, if a careful study is made of the problem and the much needed change sin cars and practice follow, thousands of dollars will be saved annually by both our industry and the carriers.

Individually we can accomplish little toward the bettering of the above discussed conditions, but, most fortunately, we have the National Sand and Gravel Association, and, by furnishing our Association with the necessary data as to our own experience and expense and lending the Association our assistance in discussing the matter with the carriers we are in touch with, I believe much can be accomplished.

(*Continued from page 80*)

The above total showed a drop of 42 per cent from the amount reported in the preceding month and was 24 per cent less than the total for December, 1926. Last month's construction record contained the following items of note: $4,833,800, or 37 per cent of all construction, for residential buildings; $2,463,500, or 19 per cent, for public works and utilities; $2,050,700, or 16 per cent, for industrial projects; and $1,647,600, or 12 per cent, for commercial buildings.

During the past year there was $219,105,000 worth of contracts let on new construction work in Texas, being a loss of 6 per cent from the total for the year 1926. New work contemplated in this state in December amounted to $36,002,900.

INTIMATE NEWS OF MEN AND PLANTS

Grand Rapids Gravel Co. Buys Additional Property

Purchase of an extensive gravel property by the Grand Rapids Gravel Company from the Certainteed Products Company has been announced by Henry N. Battjas. The property lies west of Prange Pits, Michigan and a plant to cost $50,000 will be built by April 1, to care for the increased demands of the purchasing company.

Million Dollar Addition to Limedale Plant

Indiana Portland Cement Company, a subsidiary company of the International Cement Company has a $1,000,000 addition to its plant at Limedale, Indiana, under way. The purpose of the addition is to manufacture a quick hardening cement which, according to announcement, may be used on a highway 24 hours after it is laid.

Elkan Stone Appoints Sales Manager

Elkan Stone and Tile Manufacturing Company, Macon, Georgia, has announced the recent appointment of F. E. Markert as sales manager. Mr. Markert has had a number of years' experience in the construction field and has a wide acquaintance with contractors and builders.

Limestone Sales on Increase

The limestone business will experience the most prosperous year in its history in the next twelve months, according to Lawrence Whiting, chairman of the board of directors of the Bloomington Limes Corporation, a large consolidation of stone companies in the Bloomington-Bedford district, who spoke at the open forum of the Indianapolis, Indiana, Chamber of Commerce, recently.

"It is certain," he said, "that all records, both in volume of business and in revenues will be broken during 1928. This is due to the fact that a huge construction program is in progress all over the country."

He pointed out that the federal government has a big building program, including construction of 909 federal buildings and erection of buildings at Washington. He also spoke of the building programs of railroad companies and colleges and universities. His company, he said, now has seven months of unfilled orders ahead and independent companies have been similarly successful. He predicted development of the stone industry.

Sawtelle Plant Nearing Completion

The new plans of the Reliance Rock Products Company of Sawtelle, California are completed, according to reports. The large bunkers, with ten bins, equipped to load or unload cars or trucks, with adequate mechanical appliances, occupy a city block on Sepulveda boulevard, Sawtelle, between La Grange and Mississippi avenues.

Pioneer Sand and Gravel in New Home

The new home of the Pioneer Sand and Gravel Company is located at 901-911 Harrison street in the vicinity of the city end of Lake Union, Seattle, Washington. It is centrally located in relation to all parts of the city with ample parking space is connection, space for display of the products, conference rooms and all conveniences for the staff and the patrons.

Windsor Cement Sold

The last of the retail businesses acquired by the United States Gypsum Company in 1921 has been sold, according to an announcement from the Chicago headquarters of the company. The business is the Windsor Cement Company of Boston, which was one in a string of retail establishments operated in the East by J. B. King and Company. The King Company was purchased by the United States Gypsum Company in 1921; since that time the Gypsum Company has disposed of the retail establishments as rapidly as purchasers have been found.

The purchaser of the Windsor Cement Company of Boston is M. T. Ryan. It has been announced by Mr. Ryan that the offices of the company will be retained at 18 Tremont street, but that new warehouse space, adequate for the stocking of a full line of building materials, will be procured.

Additions Under Way

Marquette Cement and Manufacturing Company, Chicago, is building 16 concrete silos, each 85 feet high, 25 foot down and will require about 1,600 pilings, in enlarging its plant at Cape Girardeau, Missouri, according to announcement. These additions will greatly increase the capacity and more than double the storage room.

Yosemite Appoints Sales Manager

L. L. Elles, who has been for nine years assistant chief engineer for the San Joaquin Light and Power Company, has been appointed district sales manager for the Yosemite Portland Cement Company at Fresno, California, according to announcement recently made by D. A. Schlemler, general sales manager.

New Incorporations

George Rogers Clark Sand & Gravel Co., Vincennes, Ind., $10,000. Glen Rainbolt, Helen Rainbolt, John A. Riddle. Sand and gravel pumping operation. To take over Rainbolt Sand and Gravel Co.

Victory Sand & Stone Co., Topeka, Kans., $100,000. Sand, gravel, stone. John Loveridge, V. P. & Gen. Mgr.; Paul Sherman, Pres.; W. E. Francis, Sec.-Treas., all of Topeka; L. A. Capsey, Kansas City, Mo.

Williford Crushed Stone Co., 269 Walnut St., Memphis, Tenn., $50,000. W. W. Fisher, 373 Boyd Ave.; W. N. Fry, 357 Boyd Ave.; L. T. McCourt, 3601 Spottswood Ave.

Copiah Gravel Co., Crystal Springs, Miss., $200,000. E. R. Owens, W. L. Wingfield.

Morton Sand & Gravel Co., 208 W. Washington St., Room 1705, Chicago, Ill., $300,000; 3,000 shares n. p. v. Mark Morton, Pres.; Wirt Morton, Sec. Pits at Wayne, Ill.

Tumalo Sand & Gravel Co., Bend, Ore., $10,000. B. L. Mitts, George G. Martin, W. F. Guernsey.

Adamant Stone Quarry Co., Miami, Fla., $10,000. J. S. Winterringer, Jack Brant, A. Brant.

Edward F. Dux Stone Co., Indianapolis, Ind., 500 shares, n. p. v. Edward F. Dux, Joseph B. Dux, Elmer J. Ittenbach.

Monroe Mining Co., Madisonville, Ky., $10,000. H. B. Lee, Geo. T. Collamore, O. S. Roberts.

Christofoli Marble & Tile Co., Jacksonville, Fla., $10,000. Samuel Christofoli, 504 W. 18th St.; E. E. Lewis; N. M. Uusch.

Mid-West Brick Co., Tulsa, Okla., $100,000. J. W. Brown, 10 S. Maybelle St.; Jess R. Marshall.

Tucksegee Development Co., Cullowhee, N. C., $300,000. W. B. Zeiler, Anthony Redmond, Asheville, N. C.; Felix E. Atley, Waynesville, N. C.

NEWS OF EQUIPMENT MANUFACTURERS

Eagle Iron Works Purchases Swintek Screen Nozzle

Eagle Iron Works have purchased the Swintek Screen Nozzle Company and will continue the manufacture and sale of the Swintek Screen Nozzle. The Eagle Iron Works are well known in the pit and quarry industries, particularly through the Eagle sand and gravel washer.

The Swintek screen and nozzle is the result of 25 years' experience in combating the various obstacles, difficulties and unusual situations met in pumping sand and gravel. An important feature is the flexible hose coupling which permits of the nozzle being raised or lowered without interfering with the flow of gravel. This machine will cut up and tear out the packed strata of mud, hardpan and cement gravel and will automatically remove the boulders, driftwood and debris and deposit them out of the way, solving the problem of securing the better grades of sand and gravel which are generally found where the deposit is the solidest. It not only loosens and agitates the hardest deposits of sand and gravel, but the traveling screen automatically carries away all boulders and obstructions which are likely to clog and cut down the flow of gravel. When the jaws encounter obstacles so large or so solid as to endanger the equipment, the safety friction clutch automatically stops the traveling screen. The nozzle may be attached to any pump boat with very little alteration of the equipment and requires no additional help, as it materially lightens the labor and the first cost is said to be the only cost, saving labor and expense from the day it is applied to the work.

G. E. Creates Motor Division

Announcement of the creation of a motor division of its industrial department has been made by the General Electric Company through E. O. Shreve, manager of the department involved. The new division will have general supervision of all policies, prices, etc., concerning all motors handled by the General Electric Industrial Department.

F. M. Kimball has been appointed advisory manager, and J. E. N. Hume, manager, of the division in question, both appointments being effective January 1, 1928. K. H. Runkle has been appointed manager of mining and steel mill sales succeeding Mr. Hume, also effective January 1.

Cutler-Hammer Opens Pacific Coast Offices

After January 1, 1928, the Pacific Coast Offices of The Cutler-Hammer Manufacturing Company, manufacturers of electric motor control apparatus and allied lines, will be handled by its Pacific Coast sales offices, at 970 Folsom street, San Francisco; 229 Boyd street, Los Angeles; 2203 First avenue, south, Seattle.

The new sales district will be in charge of Fred H. Oberschmidt, a member of the Cutler-Hammer organization for over fifteen years. Associated with Mr. Oberschmidt at the San Francisco headquarters office will be A. A. Tuffert and George P. Stone. Thomas N. Bristow will be in charge of the Seattle office and Edward G. Nelson of the Los Angeles office.

Complete stocks of standard items in the Cutler-Hammer line will be carried at all Pacific Coast offices. Special arrangements have been completed whereby production and shipment of special equipment for the Coast, built in the Cutler-Hammer factories at Milwaukee and New York, will be given preferred attention.

Chicago District Office Opened by Hendrick Mfg. Co.

Hendrick Manufacturing Company, manufacturers of Mitco Interlocked Steel Grating, Mitco Shur-Site Stair Treads and Mitco Armorgrids, announces the opening of a Chicago District Office, 223 Railway Exchange Building, Chicago, in charge of Mr. Lon Sloan. Mr. Sloan's extensive floor grating experience is available to those concerned with the selection of floor grating, stair treads and armorgrids for reinforcing concrete floors, platforms and driveways.

Pollock Joins Nugent

George L. Pollock, vice-president and treasurer of the Burnside Steel Foundry Company since its organization, has resigned as of January 1 to become vice-president of The Nugent Steel Castings Company, Chicago.

Prior to becoming associated with the foundry industry, Mr. Pollock had been with the purchasing department of the Burlington Railroad and later served as purchasing agent of the Wheeling and Lake Erie Railroad and the Chicago and Western Indiana Railroad and Belt Railway Company of Chicago.

New G. E. Pension Plan

A contributory pension plan, whereby employees pay in a small part of their wages from year to year to a pension fund, supplementing the old age pension system which the General Electric Company has had in effect since 1912, has been announced by Gerard Swope, president of the company. At the same time Mr. Swope announced the creation of a pension trust. Instead of the company carrying a reserve on its balance sheet sufficient to meet its obligation to employees reaching the retiring age, $5,000,000 has been turned over to the trustees of the new trust by the company.

Pensions at present are computed at 1½ per cent of the earnings of employees for each year of continuous service. Under the contributory plan of additional pensions, which it is proposed to make ecective January 1, 1929, 1½ per cent of the annual earnings of the employees will be turned over to the custodians, a board of seven on which the employees will have representation. This money will be invested and held for the employees individually. Interest will be allowed to accumulate.

The retiring age in the past has been 70 years for men. Under the new plan it is proposed to make this 65 years for men and, as at present, 60 years for women. At the time an employee reaches the retiring age the custodians of the fund will pay the accumulated amount in full or in installments. If an employee leaves the service of the company or dies before reaching the pension age the amount accumulated, with interest, will be given him or his estate.

R. H. Beaumont Add

The R. H. Beaumont Co. of Philadelphia announces that Mr. Wm. P. Alexander, who resigned from their organization in May of last year, has returned to their sales department, and as formerly, will devote himself to sales duties in the Philadelphia, Baltimore and Washington district.

L. O. Hassler Transferred

The Beaumont Manufacturing Co. of Philadelphia announces the transfer of its former chief engineer, Mr. L. O. Hassler, to their Western Headquarters, Strauss Building, Chicago, where he will devote himself to sales of their products in the Chicago territory under direction of Mr. H. E. Birch.

Imperial Engine Expanding

The Atlas Imperial Engine Company, manufacturers of full Diesel engines and gas engines, are making extensive plant changes due to the tremendous increase in their business. The plant extensions will increase the present floor space by about 30 per cent. New equipment which is being installed will also increase the number of engines produced daily.

R. H. Beaumont at Road Show

This year's Road Show in Cleveland will find R. H. Beaumont Company at Booth EH-17 with working models of the Beaumont cable drag scraper system and Beaumont slackline excavator system.

The two systems will be operated by separate electrically-driven model winding machines on a 6 by 10 foot field filled with sand. The slackline excavator system will dig sand at tail end of operating field and discharge it into a chute at mast to form an initial pile for cable drag system which will convey it out to end of operating field to be brought in again by slackline system, thus giving a continuous path for the material.

The Beaumont Simplex and Duplex Gates will also be on exhibit. The exhibit will be in charge of the Eastern Sales Manager, Mr. A. F. Forschner.

Osgood Exhibit at Road Show

The Osgood Company will exhibit at the Cleveland Public Auditorium during the Good Roads Show, January 9th to 13th, an Osgood 1¼ yard heavy duty gasoline shovel. This machine will have many refinements and represents the latest efforts of our designing engineers.

Link-Belt Appoints Vice-Presidents

Link-Belt Company has announced the appointment of four vice-presidents: George P. Torrence, with headquarters at Indianapolis, in general charge of Indianapolis operations and sales of Indianapolis plant products; George L. Morehead, Philadelphia, in charge of eastern operations and sales; Frank B. Caldwell, in charge of the Chicago plant and sales offices tributary thereto; W. C. Carter, in general charge of production at all plants, with headquarters at the general office of the company, 910 S. Michigan Ave., Chicago.

In addition to the foregoing the officers of the Link-Belt Company are: Charles Piez, chairman; Alfred Kauffmann, president, both located at Chicago; Humphrey J. Kiely, vice-president, New York City; Richard W. Yerkes, secretary and treasurer, Chicago.

Westinghouse Elects

At a meeting of the board of directors of the Westinghouse Electric and Manufacturing Company, held in New York recently, the following officers were elected; Clinton M. Finney, comptroller; Warren H. Jones, secretary; Edward J. Mulligan, assistant secretary.

Clinton M. Finney comes to the Westinghouse organization from the Worthington Pump and Machinery Company where he held the office of comptroller since 1919 and of vice-president since 1926. Prior to that time he was secretary and treasurer of the Mack Truck Companies and treasurer of the George V. Cresson Company. He is a native of Pennsylvania and a graduate of the University of Pennsylvania. In 1926 he was elected president of the National Association of Cost Accountants.

Warren H. Jones has held the position of assistant secretary of the Westinghouse Electric and Manufacturing Company from 1911 to date. He was previously secretary to Robert Mather, former chairman of the Westinghouse Board. He was born in Amherst, Mass., graduated from the La Grange (Illinois) High School, and studied law at the Chicago Law School and in the legal department of Winston, Payne and Strawn, Chicago.

Edward J. Mulligan after attending the Port Richmond, Staten Island High School, began his business career as office boy to George Westinghouse twenty-five years ago. Since that time he has remained continuously in the executive department of the Westinghouse Company, rising from one position to another. During recent years he was secretary to James C. Bennett, formerly comptroller and secretary, now vice-president.

New Harnischfeger Office in Cleveland

Harnischfeger Corporation, factory and home office at Milwaukee, Wisconsin, has recently established a branch office at Cleveland, Ohio. The address of the new office is 340 Rockefeller Bldg., telephone Superior 2584. Mr. J. T. Connors, District Manager, is in charge of the office.

Fairbanks Morse Elects

At a recent meeting of the Board of Directors of Fairbanks, Morse and Company it was announced that P. C. Brooks had been elected a vice president. During a connection of twenty-nine years with the organization Mr. Brooks has held many positions of responsibility and in addition to his present office he is President of E. & T. Fairbanks & Company, the scale manufacturing subsidiary of Fairbanks, Morse & Company. He is also vice president of the Canadian Fairbanks-Morse Company, Ltd.

After graduating from Georgia Tech in 1891 where he studied mechanical engineering, he was connected with a number of manufacturing organizations and in 1899 he went to the Beloit Works of Fairbanks, Morse & Company where he became Assistant Manager and then Acting Manager. From this time on his rise was marked by appointment to various positions of executive character. During the past ten years he has been actively directing the development of the scale business both in the United States and Canada.

During the war the Canadian Fairbanks-Morse Company, Ltd., was the largest private producer of munitions in the British Empire. Mr. Brooks' activity in this work played an important part in keying up other manufacturing plants for efficient and volume production of munitions at the time when the need of these was very urgent.

New Wood Hydraulic Unit

The Wood Hydraulic Hoist and Body Company announces the addition of the new G-1, Hi-Speed underbody hydraulic hoist to its line of dump truck equipment.

The G-1 Hi-Speed hoist is designed for short wheelbase, light, speedy, pneumatic-tired trucks with close-coupled chassis. It is claimed to be the speediest hoist built, being capable of dumping the load in less than five seconds. It elevates the body to an angle of 60 degrees.

It is primarily designed for contractors, road builders and supply dealers who need power-operated equipment for short wheelbase chassis of the roadbuilder 1 ton and 1½ ton types and demand speed as the first essential. The G-1 is easily installed and simple to operate, employing the well known hydraulic principle deriving its power from the truck transmission.

On the roadbuilder chassis it gives all the advantages of a heavier unit, yet with compact, fast operation, flexibility and convenience of handling in the most congested places.

"Permissible Explosives" Not "Permissible" Unless Correctly Used

"Permissible explosives" cease to be "permissible" if not used in conformity with the carefully specified system outlined for their use by the United States Bureau of Mines, Department of Commerce, states Dr. C. E. Munroe, chief explosives chemist of the bureau, in circular 6051. The term "permissible explosive" simply indicates that, after thorough tests by the Bureau of Mines, the explosive has been found safer than other explosives, provided it is used in precise accordance with the specifications made for it.

A permissible explosive, correctly specified, is a system in which the designated explosive is but one of the factors. The weight of the charge, the kind of electric detonator and the kind of stemming used must each conform with the specifications, while, further, the shot must not be a depending one, or bored into the solid, or have a burden so heavy that the shot is obviously liable to blow-out and the shot must not be fired in the presence of a dangerous percentage of fire-damp.

Permissible explosives are selected by means of carefully prescribed tests, applied to each of them in a definitely prescribed manner, from among explosives developed in manufacture. Permissible explosives are high explosives as they detonate and their explosions are initiated by detonators. Among permissible explosives are explosives of the dynamite, ammonia dynamite and the gelatin dynamite classes. The fact that any one of these explosives is selected for use as a permissible explosive does not change its nature. It still, in manufacture, transportation, storage and use, must be treated as a high explosive.

If, in the course of manufacture of such an explosive, through carelessnes or other cause, the explosive exploded, this can have nothing to do with the fact that it had been designated as a permissible when used under definitely prescribed conditions. In transportation, if an explosion occurs because the explosive is stored in a car with loose machinery, or it is involved in a wreck or fire, or it encounters a stray current or coronal discharge, this can have nothing to do with its permissibility. In storage, if an explosion occurs because of lightning, or from detonators or other explosives stored with it, none of the causes has the least connection with permissibility. Many other examples under other circumstances might be cited, all showing that permissible explosives, by passing the tests for permissibility and being placed on the permissible list, have not been in any manner changed. They each retain their explosive characteristics.

In any instance, when it is alleged that a permissible explosive had undergone accidental explosion or failed in use, it must be proved that the explosive at the time was being used in absolute accordance with the specifications, for, if they were deviated from in any particular, the explosive automatically ceased to be a permissible explosive.

In further reviewing this topic, Dr. Munroe suggests that perhaps the factor of age limit should be added to the specifications of a permissible explosive. Time effects changes in everything, the rate varying with each substance and the conditions of exposure. Realizing this, the United States Bureau of Mines has from the outset urged operators to use fresh explosives. With the introduction of gelatin dynamites, it is noted that these age changes which effect the action of the explosive occur sooner with the gelatin dynamites than with other explosives, and yet the former possess properties which make them most desirable for use. It is unfortunate when the properties or behaviors of a few explosives necessitate drafting additional specifications for all. But circumstances sometimes arise to require it.

The quantity of permissible explosives sold in the United States in 1926 was 67,685,416 pounds. This represents an increase of 16 per cent over the volume of sales in the preceding year, and is the largest quantity of permissible explosives sold for use in this country in any year.

Dr. Monroe's suggestions regarding the use of permissible explosives in a permissible way are given in Information Circular 6051, copies of which may be obtained from the United States Bureau of Mines, Department of Commerce, Washington, D. C.

Lightweight Combination Cutting and Welding Torch

The Alexander Milburn Company has recently developed a new lightweight torch which cuts or welds with the mere interchange of tips, made to operate with either oxygen and acetylene, oxygen and hydrogen or other gases. This torch, known as the Milburn Type RI, has all the salient features of the Milburn combination cutting and welding torch, Type NI. The latter is the original two-purpose torch, cutting or welding the lightest or heaviest metals within range of the process by a mere change of the tips, and obviates the necessity of using two torches or disconnecting hose from the torch valves when changing from cutting to welding operations or vice versa.

Some important features of the lightweight combination torch are: The torch has only two gas tubes (made of stainless steel); the high pressure cutting oxygen thumb button which remains fixed in either open or closed position without sustained pressure from the thumb; the forged bronze torch head and valves having a tensile strength of 60,000 pounds per square inch; it uses the heat to the best advantage while affording protection to the hands of the operator; all valves readily accessible; well-balanced; easy to handle; and the supermixing of gases resulting in a neutral, uniform flame as well as the elimination of flashbacks.

Peace Time Activities of Explosives Manufacturers

Some impressive figures showing the extent to which explosives enter into the industrial and agricultural activities of the country were given recently by J. Thompson Brown, general manager of the du Pont Explosives Department, in his opening remarks before the 125th Anniversary Convention of his department. These figures can be interpreted as an answer to the oft repeated question: "What do explosives manufacturers do in times of peace?"

The total output of commercial or blasting explosives by the du Pont Company for the year 1927, according to Mr. Brown, will be 207,000,000 pounds. One of its plants, the Repauno Plant upon the New Jersey Shore of the Delaware River, has a record output for the year 1926 of 66,000,000 pounds of commercial dynamite. Its output goes on the market almost entirely in the form of a standard cartridge one and one-quarter inch by eight inches and these cartridges placed end to end would encircle the globe at the Wilmington latitude. In addition to this manufacture of high explosives, the du Pont Explosives Department operates at Mooar, Iowa, the largest black blasting powder plant in the world.

Mr. Brown reviewed the advance in the manufacture of explosives since the last general convention of his department held in 1922. During this time, he said, there have been produced at the plants of the department, commercial explosives aggregating 1,020,000,000 pounds which have been used in peace time activities. He made an interesting comparison between this five year output and the

total output of 1,466,700,000 pounds of military explosives of all kinds manufactured by the company during the four and one-half years of the World's Greatest War.

The demand for industrial explosives is growing so rapidly that important expansions have been made. In 1924 the properties of the General Explosives Company were acquired, including a plant at Carl Junction, Missouri, with a dynamite capacity of 15,000,000 pounds annually. In 1926, the need arose for additional explosives manufacturing capacity on the Eastern Seaboard, the capacity at Repauno Works was taxed to its limit, and recognizing the growth of business in the Southern Atlantic States and importance of the Birmingham, Alabama mining district, it was decided to build a dynamite plant in that location. The site was selected in May, 1926, ground was broken October, 1926, and the plant turned out its first product on June 1, 1927, a record for minimum time in the construction of a plant of this nature with a capacity of 15,000,000 pounds of dynamite per annum.

Among the important developments, during the past five years, was the change from nitrate of soda to ammonia for the manufacture of nitric acid, the utilization of ethyleneglycol in dynamite manufacture to prevent freezing, and the production at Deepwater Point, New Jersey, of glycerine by fermenting molasses.

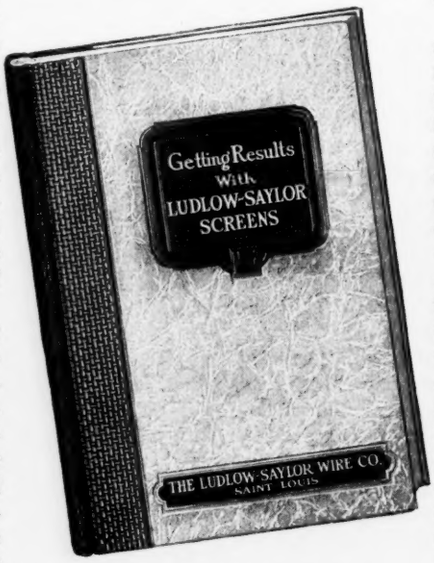
One of the new products of importance is pellet powder which can be produced in the old black blasting powder plants of the company, and its manufacture was started for the purpose of prolonging the life of the investment in those plants, and at the same time to give to the former users of black blasting powder an explosive that would be safer to handle and more convenient to use. The Explosives Department now has equipped its black powder mills at Mooar, Iowa, Fairchance, Pa., Nemours, W. Va., and Consumers, Pa., with machinery for the manufacture of this finished product, and has produced to date approximately 13,000,000 pounds, reaching a maximum in the month of November, 1926, when 1,250,000 pounds were turned out.

Lincoln Transfers Hoff

The Lincoln Electric Company, Cleveland, Ohio, announces the transfer of Mr. E. F. Hoff from the Welder Division at Cleveland to the Welder Division at New York where he will be in charge of Welder Service under the direction of Mr. G. N. Bull, District Manager.

Wire Cloth and Woven Screens

Just received a new 190 page, illustrated, neatly bound catalog, entitled "Getting Results With Ludlow-Saylor Screens," from the Ludlow-Saylor Wire Company of St. Louis, which is offered free to the screen users of America. The volume contains valuable tables which should be of unusual interest and value in the use and design of screens.



Sixty-six leading makers of vibrating screens, revolving screens, bolters, filters, pulverizers and other screen controlled equipment have cooperated in the production of this comprehensive edition for which the publishers give due credit. As a result the catalog shows all layouts and equipment as their designers would have them shown. No screening device or screening information has been consciously slighted or misrepresented.

The book contains such necessary information as points to consider in the choice of sizing screens; complete reference data on double crimped wire cloth and woven screens; special wire cloths for unusual services, controlling wastes with woven screens; and an appended section containing among other useful data, American vs. European wire gauge systems, how to gauge wire and the United States standard test sieve system.

Mack Announces AK Model High-Speed Heavy Duty Truck

With the addition of the new 3½ to 5 ton AK model to its regular line of motor trucks and buses, Mack Trucks, Inc., offers a distinctive unit with 162, 174 and 186 inch standard wheelbases, that has speed and control possibilities which greatly enhance its value in the field of heavy tonnage carriers.

Many of the characteristic features include the heavy duty four cylinder engine with three point suspension, heat treated semi-steel cylinders, drop forged and case-hardened crankshaft having three-inch diameter journals; the Mack type of force feed and splash lubrication; the Model AC hood with tubular radiator in cowl, and beltless blower type fan all mounted in rear of engine; the exclusive Mack water pump of the balanced bronze rotor type; the clutch of large single disc type; and transmission with four speeds forward and one reverse with gears mounted on patented Mack interrupted spline shaft.

The engine of 4⅝ inch bore and 6 inch stroke has cylinders cast in black with detachable aluminum heads. The transmission is suspended in four blocks of live, resilient rubber held under compression. A cover opening at the side permits easy accessibility to the transmission without removing the floorboards. Springs are rubber shock insulated, reducing vibration and eliminating entirely the lubrication problem of metal shackles.

Being a high speed heavy duty carrier, four wheel brakes of the internal expanding type have been made standard. The emergency brake operates mechanically and is of the external contracting type. On the chain drive model it is located on both jackshafts while on the dual reduction model it is mounted on the rear end of the transmission. It has a sharp turning circle which has been effected by center point steering which makes for exceptionally easy handling in traffic. A forty gallon gasoline tank is mounted under the driver's seat with the filler opening through the right side of the cab. The cab itself is all steel with sliding doors and is mounted in rubber shock insulators. In addition to shock insulating the cab, the seats are mounted in rubber.

Rollway Opens Another Office

For the convenience of customers in the Pittsburgh district, the Rollway Bearing Company, Inc. have opened a sales office at 614 Empire Building, Pittsburgh, Pennsylvania.

Mr. Samuel Farrell who has been affiliated with the Rollway Bearing Company, Inc., for a number of years with headquarters at Youngstown, Ohio, is in charge of this office.